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BULLETIN

OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

Vol. XXXVIII 1943

EDITED BY
J. R. de la TORRE-BUENO

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J. R. de la TORRE-BUENO, *Editor*
ALBRO T. GAUL EDWIN W. TEALE

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ALBRO T. GAUL EDWIN W. TEALE

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DEVELOPMENTAL STAGES OF CATORHINTHA MENDICA (COREIDAE, HEMIPTERA).

By J. S. Slater, University of Illinois.*

This article constitutes a companion of the preceding paper by W. V. Balduf on the bionomics of *C. mendica* (Bul. B. E. S. 37: 158–166, 1942). Since the adult stage has already been adequately described by Stål (1870), Blatchley (1926) and others, only the egg and the nymphs are treated here. The nymphal descriptions that follow are based on a study of the more typical forms selected from several hundred specimens taken on *Mirabilis nyctaginea* (Mich.) in the vicinity of Urbana, Illinois.

The Egg.

Chorion uniformly dull brown, unsculptured; form of egg unusual in being six-sided, all sides flat; dorsal and ventral surfaces parallel, laterals diverging moderately from top toward venter, hence the dorsum is smaller in area than the venter; operculum or cephalic surface oblique, caudal end nearly vertical; length at dorsal surface 1.10 mm., at ventral surface 1.25 mm.; dorsal and ventral widths average 0.5 mm.; depth slightly less than width. (Fig. 1.)

The Nymphs.

Key to the Instars.

1. Mesothoracic wing pads extending caudad upon succeeding segments; apical antennal segment shorter than second and third segments combined 3

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* Contribution No. 233 from the Entomological Laboratories of the University of Illinois.

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Mesothoracic wing pads not exceeding the mesonotum caudad or invisible; apical antennal segment subequal to, or longer than second and third segments combined 2

2. Wing pads invisible; color black and red .... FIRST INSTAR

Wing pads barely visible on mesonotum and metanotum; color yellowish-buff, mottled with black and reddish SECOND INSTAR

3. Caudal edge of pronotum entire, not emarginate; wing pads extending caudad to cover at most the first abdominal tergite THIRD INSTAR

Caudal edge of pronotum shallowly emarginate; wing pads extending caudad to cover the first abdominal segment, or farther 4

4. Mesothoracic wing pads less than three-fourths the length of head and pronotum combined .... FOURTH INSTAR

Mesothoracic wing pads as long as, or more than three-fourths the length of head and pronotum combined ... FIFTH INSTAR

Description of the Instars.

First instar: General color rose-red; head, nota of thorax, two apical segments of abdomen and orifices of dorsal stink glands black; antennae light reddish-buff, apical segment darker; legs and beak tawny-brown, apex and base of femora with a white band; first tarsal segment whitish-tawny.

Head proportionately very large, as long as, or longer than, thorax; antennae four-segmented, apical segment longer than, or subequal to, segments two and three combined; beak four-segmented, reaching caudad of metacoxae; wing pads invisible; mesonotum and metanotum subequal; second abdominal segment possessing a row of six setae across the center of the tergite; seventh and eighth abdominal tergites with a spine on each side of median line; orifices of dorsal stink glands lacking a pair of spines; body and appendages sparsely setose, setae black; hind femora unarmed beneath. Average length 1.91 mm. Extremes 1.6 mm. to 2.3 mm.

Second instar: General coloration light buff, mottled heavily with dark brown, black and reddish; base of head bearing a wide black band which extends ventrad to gula and cephalad along lateral margins almost to compound eyes; mesonotum and metanotum bearing a pair of black spots; each of the two caudal abdominal tergites, orifices of dorsal stink glands, median portion of bucculae, spot on lateral margin of each abdominal segment and spiracular rings black; legs and antennae ferruginous-brown; legs mottled whitish; apex of third antennal segment and apex and base of femora white.

Head relatively smaller than in previous instar; tylus and juga extending a considerable distance beyond the antenniferous tubercles; beak extending caudad past the metacoxae and onto the first abdominal sternite; mesothoracic and metathoracic wing pads visible, not extending caudad of the respective segments from which they arise; setae less conspicuous than in first instar. Average length 2.75 mm. Extremes 2.3 mm. to 3.2 mm.

Third instar: General form and color as in second instar; antennal incisures reddish; calli more conspicuous; mesothoracic wing pads extending caudad over the metanotum; setae minute, sparse and inconspicuous. Average length 3.92 mm. Extremes 3.3 mm. to 4.2 mm.

Fourth instar: General coloration as in two preceding instars; black markings more conspicuous; antennae blackish apex of third antennal segment, incisures and mottling on legs whitish-yellow.

Caudal edge of pronotum shallowly emarginate; mesothoracic wing pads reaching caudad over the first and sometimes the second abdominal tergite; beak not surpassing metacoxae. Average length 5.44 mm. Extremes 4.8 mm. to 6.1 mm.

Fifth instar: General coloration as in preceding three instars, ochraceous-buff in recently molted individuals; antennae, apex of juga, base of labrum, beak, and spots at base of head, on pleura, on each of the abdominal sterna and near lateral edge of the mesonotum black; apex of third antennal segment and incisures whitish-yellow; abdominal tergites spotted white to ochraceous-orange at caudolateral angles; legs light buff-yellow, heavily mottled with fuscous-black, apical fourth of tibiae and all of tarsi fuscous-black.

First antennal segment stout and two-thirds length of head, fourth longer than third, but shorter than two and three combined; head widest between eyes, longer than wide; base of pronotum emarginate, side margins straight, feebly serrulate; mesothoracic wing pads extending caudad over the basal three abdominal tergites; legs simple, hind femora unarmed beneath; beak not reaching caudad to the metacoxae; body sparsely punctate. Average length 8.24 mm. Extremes 7.0 mm. to 10.5 mm.

REFERENCES CITED.

See previous article, by W. V. Balduf, 1942, Bul. B. E. S. 37: 158–166.

EXPLANATION OF PLATE.

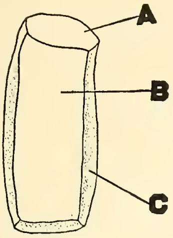
Fig. 1. The egg. A. Cephalic end. B. Dorsal surface. C. Lateral surface.
Fig. 2. First instar.
Fig. 3. Second instar.
Fig. 4. Fifth instar.
Fig. 5. Third instar.
Fig. 6. Fourth instar.

The Generic Names *Chartergus, Parachartergus, Epipona* and *Tatua*. A Correction (Vespidae, Hymenoptera).—Shortly before her untimely death, the late Miss Grace Sandhouse called my attention to a serious oversight, which vitiates my use of several generic names in a paper revising some Neotropical social wasps (1938, Revista de Entomologia, IX, pp. 99–117). In order to avoid further confusion the necessary corrections should be made in print. As Miss Sandhouse pointed out to me, Emile Blanchard in 1840 (Hist. Nat. Ins., Orth. Névr. Hém. Hym., Lép. Dipt., pp. 394 and 395) designated genotypes for *Epipona* and *Chartergus,* a fact which I had overlooked. This necessitates the following changes:

1. *Parachartergus* v. Ihering (1904) is the valid name of the genus I called (1938) *Chartergus.*

2. *Chartergus* Lepeletier (1836) has as type *Vespa nidulans* Fabricius (1793) = *Vespa chartaria* Olivier (1791), as designated by Blanchard. Hence it is the valid name of the genus I called (1938) *Epipona. Chatergus* Erichson (1838) (not *"Chartergus"* as this was "corrected" by the Editor of the Revista) is a misspelling of *Chartergus.*

3. *Epipona* Latreille (1802) has as type *Vespa morio* Fabricius (1798) = *Vespa tatua* Cuvier (1797), as designated by Blanchard. Hence it is the valid name of the genus I called (1938) *Tatua* H. de Saussure (1854). The latter, having the same type (by Ashmead's designation), becomes a synonym of *Epipona.*—J. BEQUAERT, Museum of Comparative Zoölogy, Cambridge, Mass.



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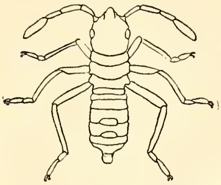

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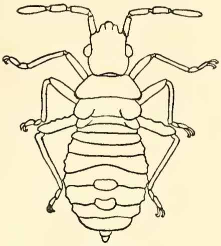

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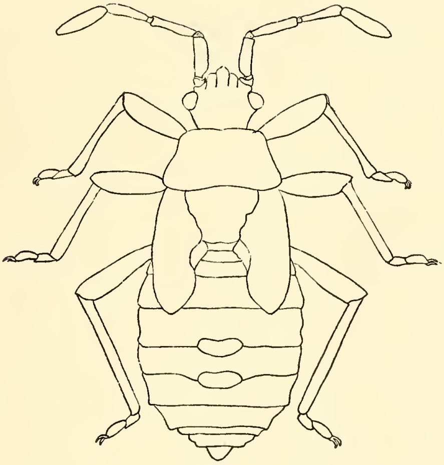

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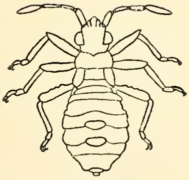

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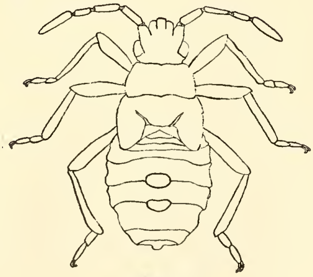

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NORTH AMERICAN STENODYNERUS OF THE ANORMIS GROUP (VESPIDAE, HYMENOPTERA).

By Richard M. Bohart, University of California,
Los Angeles, Calif.

Stenodynerus anormis (Say) and related species are fairly slender wasps of moderate size, possessing the two pits on the front face of the pronotum which are characteristic of the genus *Stenodynerus* and having no acarinarium under the relatively short first abdominal tergite. They are particularly distinguished by having the apex of the clypeus essentially straight or convex in both sexes.

Holotypes and allotypes of the new species and subspecies described herein have been deposited in the collection of the California Academy of Sciences. The disposition of the paratypes is indicated in the text.

Key to the North American Stenodynerus of the Anormis Group.

Without an acarinarium under the short first abdominal tergite; second tergite basally cribrose under the apical margin of the first; apex of clypeus essentially straight or convex in both sexes.

1. Postscutellum strongly raised in the form of a rough bilobed crest; apex of clypeus very narrow and often convex; interocellar area raised over each ocellus eyelid-like, particularly in males; projecting postero-lateral angle of mesonotum three times as broad as an ocellus .... *percampanulatus*
   Postscutellum low, hardly raised above scutellum; interocellar area not swollen; projecting postero-lateral angle of mesonotum hardly broader than an ocellus 2
2. Male middle femur strongly compressed apically so that the apical half is concave above; apex of female clypeus slightly convex and about as wide as length of fourth antennal segment *anormis*
   Male middle femur depressed baso-ventrally but normally convex on apical half above; apex of female clypeus truncate and at least as wide as length of third antennal segment 3
3. Summit of first tergite with a weak but distinct transverse carina 4
   Summit of first tergite without a transverse carina 5
4. Markings chiefly yellow .... *clypeolatus clypeolatus*
   Markings chiefly reddish .... *clypeolatus floridanus*

5. Projecting postero-lateral angle of mesonotum relatively short and smoothly rounded apically, especially in females; terminal antennal segment of male mostly light-colored; apical middle of second sternite with a low and smoothly rounded hump 6

   Projecting postero-lateral angle of mesonotum relatively long and slender, almost pointed apically; terminal segment of male antenna entirely black; apical middle of second sternite in male with a sharply rounded ridge 7

6. Markings whitish in both sexes
   blandoides blandoides n. sp. & subsp.

   Markings yellowish in both sexes
   blandoides owensi n. sp. & subsp.

7. Markings of female yellow, those of male whitish
   blandus blandus

   Markings of female yellow, those of male yellow, at least partly
   blandus **catalinae** n. subsp.

Stenodynerus percampanulatus (Viereck)

Odynerus percampanulatus Viereck, 1906. Tr. Am. Ent. Soc. 32: 200 (holotype U.K.).

Odynerus blawus Rohwer, 1915. Proc. U. S. Nat. Mus. 49: 240.

Odynerus odontoschius Rohwer, 1915. Proc. U. S. Nat. Mus. 49: 241.

Odynerus odontoschius dichrous Rohwer, 1915. Proc. U. S. Nat. Mus. 49: 241.

Distribution: Hamilton Co., Kansas (F. H. Snow) (type locality); Ainsworth, Oklahoma: Albuquerque, New Mexico (J. P. Watson); Las Cruces, New Mexico (T. D. A. Cockerell); Kayenta, Arizona (H. N. Hultgren); Claremont, California; Cajon Canyon, California (E. G. Rinsley); Benton, California (E. G. Anderson); Antioch, California (G. E. Bohart); Gardena, Washington (V. N. Arge).

There is a pronounced color range in this species from predominantly black and yellow to black, red, and yellow to predominantly red and yellow. The names given by Rohwer—*blawus, odontoschius,* and *dichrous* all pertain to the typical red and yellow variety. At present the designation of subspecies on the basis of color does not seem warranted in this species.

Stenodynerus anormis (Say)

Eumenes anormis Say, 1824. Keatings Narrat. Exped. II App., p. 346.
Odynerus oculatus Say, 1837. Boston Jour. Nat. Hist. 1: 385.
Odynerus abnormis Say, 1837. Boston Jour. Nat. Hist. 1: 387.
Odynerus persecutor Saussure, 1855. Et. Fam. Vespidae 3: 133.
Rhynchium anorme Saussure, 1855. Et. Fam. Vespidae 3: 184.
Odynerus philetas Cameron, 1908. Tr. Am. Ent. Soc. 34: 214, 218.
Odynerus approximatus Cameron, 1909. Pomona Jour. Ent. 1: 79, 128.

The holotype has been destroyed. For this reason a neotype male and a neallotype female are hereby designated and placed in the California Academy of Sciences. Neotype male, Delta, Colorado, June 25, 1938 (R. Bauer); neallotype female, Longmont, Colorado, Sept. 9, 1938 (U. Lanham).

DISTRIBUTION: North America. States from which I have seen specimens are New York. New Jersey, Virginia, North Carolina, South Carolina, Michigan, Iowa, Illinois, Missouri, Texas, Arkansas, Kansas, Nebraska, New Mexico, Arizona, Colorado, Utah, Wyoming, Washington, Oregon, and California.

Stenodynerus clypeolatus (Dalla Torre)

Odynerus clypeatus Robertson, 1901. Tr. Am. Ent. Soc. 27: 199 (nec Saussure, 1852) (cotypes, U.S.N.M. and A.N.S.P.)
Odynerus clypeolatus Dalla Torre, 1904. Genera Insectorum 19: 42.
Odynerus bradleyi Robertson, 1926. Psyche 33: 126 (nec Cameron, 1909).
Ancistrocerus clypeatus Bequaert, 1925. Tr. Am. Ent. Soc. 51: 82.

DISTRIBUTION: I have seen specimens from New York, New Jersey, Maryland, Virginia, Louisiana, Texas, Indiana, Illinois (type locality Carlinville), and Minnesota.

This species is related to *anormis* which it resembles closely. Careful examination of the characters given in the key is necessary to separate the two species.

Stenodynerus clypeolatus floridanus Robertson

Odynerus floridanus Robertson, 1901. Tr. Am. Ent. Soc. 27: 200 (cotype, A.N.S.R.)

Ancistrocerus floridanus Bequaert 1925. Tr. Am. Ent. Soc. 51: 82.

DISTRIBUTION: Florida: Vero Beach (W. Benedict), Punta Rassa (J. C. Bradley), Inverness (C. Robertson, type locality).

Stenodynerus blandoides Bohart, n. sp.

Male. Black, marked with whitish as follows: Mandible, clypeus, basal antennal segment in front, interantennal spot, orbital line, postocular spot, a pair of pronotal spots, tegula mostly, spot beneath, postscutellum mostly, coxae and femora partly, tibiae mostly, lateral spot on first and second tergite, apical margins of first six tergites and second to fifth sternites (those on 4 and 5 broken). Antenna, mandible, and tarsi becoming reddish apically, hook of antenna pale reddish, wing veins reddish to brown. Body moderately punctured, clypeus fairly sparsely and strigosely punctured. Last antennal segment flattened, broadly rounded apically, fitting into a groove. Clypeus very slightly concave apically, longer than broad. Humeral angles not prominent, slightly obtuse, middle femur slightly depressed baso-ventrally, parategular projection of mesonotum whitish and smoothly rounded apically. Second tergite not reflexed apically, second sternite slightly wavy, with three low humps. Aedeagus very slender along apical third, free part of paramere subquadrate and covered with moderately long hairs. Length to apex of second tergite 6 mm.

Female. Markings as in male with following exceptions: Antennal flagellum dark, mandible whitish at base only, clypeus black-margined and with a central black spot, mesonotum and propodeal angles white-spotted, coxae dark, sternites 3 and 4 with lateral spots only, 5 entirely dark. Clypeus apically truncate, longer than broad. vertex pit distinct, slightly larger than an ocellus. Length to apex of second tergite 6.5 mm.

Holotype male and allotype female, Davis Creek, Modoc Co., Calif., July, 1922 (C. L. Fox). Paratypes, California: 2 females, Tahoe (E. C. Van Duzee, F. X. Williams); 2 males, Modoc Co. (C. L. Fox). Oregon: 1 male and 5 females, Steens Mts. (Bolinger-Jewett); 3 pair, Crater Lake Park (H. A. Scullen); 1 pair, Elgin (Bolinger-Jewett); 1 pair, Hereford (H. A. Scullen); 2 males and 1 female, Baker (H. A. Scullen); 1 pair, Blitzen Valley (S. Jewett); 2 pair, Hart Mt. (Bolinger-Jewett); 1 pair, Prairie

City (H. A. Scullen). Washington: 1 pair, Pullman. Utah: 1 pair, Logan Canyon (G. F. Knowlton). Colorado: 2 males, Meeker. I have also seen specimens from Walla Walla, Washington; Paonia, Colorado; Craters of the Moon and Moscow, Idaho; and many localities in Oregon, Wyoming, and Utah. Paratypes in collections of Washington State College, Oregon State College, Utah Agricultural College, University of Colorado, U. S. National Museum, and J. Bequaert.

This species is very close to *S. blandus,* but in addition to the distinctive color characters given in the key, the male of *blandoides* has a somewhat smaller antennal hook and a smoother second sternite. In specimens from the Owens Valley, California the markings of both sexes are distinctly yellow. This subspecies is designated below. The female of this race is best separated from that of *blandus* by the broader parategular angles of the mesonotum.

Stenodynerus blandoides owensi Bohart, n. subsp.

Resembling typical *blandoides* except that the markings of both sexes are yellow.

Holotype male, Big Pine, Inyo Co., Calif., June 18, 1920 (E. P. Van Duzee). Allotype female, Big Pine Cr., Inyo Co., Calif., June 17, 1942 (R. M. Bohart). Paratypes, 2 males, same data as allotype; 1 male Big Pine, Inyo Co., Calif., June 23, 1937 (E. C. Van Dyke); 1 male, Monache Meadows, Tulare Co., Aug., 1917 (S. R. Pilate).

Stenodynerus blandus (Saussure)

Odynerus blandus Saussure, 1871. Rev. and Mag. Zoo. 22: 105.

Odynerus giffardi Rohwer, 1917. Proc. U. S. Nat. Mus. 53: 237.

Distribution: California (widespread and common); Oregon (Corvallis, Mt. Hood, Crater Lake, Colestin, Klamath L., Hood River, Oakridge, Hart Mountain); Washington (Metaline Falls, Walla Walla, Wawawai); Idaho (Moscow, Lewiston, Chatoolet, Sweet); Wyoming (Grand Teton National Park); Arizona (Baboquivari Mts.); Lower California (Ensenada).

Stenodynerus blandus catalinae Bohart, n. subsp.

Markings and structure as in typical *blandus* except that the male has the markings yellow instead of white and the second sternite in the male is more smoothly contoured.

Holotype male and allotype female, Avalon, Santa Catalina

Islands, California, Sept. 6, 1907 (C. L. Fox). Paratypes, 2 pair, Santa Catalina Islands, Calif. (T. D. A. Cockerell and W. P. Crus); 3 males, San Diego, California, Mar. 29, 1891 (F. E. Blaisdell). Paratypes in collections of Southern California Academy of Sciences and J. Bequaert.

Extension of Range of Crambus teterrellus (Zincken) (Pyralididae).—Sudden extensions of the range of a species are always of potentially great interest, but are all too seldom observed or, if noted, are not commented on in sufficiently public fashion. It seems worthwhile, therefore, to note the recent northward extension of *Crambus teterrellus* (Zincken). Until about 1925 this species was of decidedly uncommon or rare occurrence in New York and New England. Forbes (Lepidoptera of New York . . . 1920, p. 602) lists it as "common north to New York, rarer in Maine." His only New York record, however, both there and in the New York State List of Insects, is based on an old specimen in the Henry Edwards Collection in the American Museum. Fernald (The Crambidae of North America, 1896, p. 51) lists it from Maine, New York, Pennsylvania, Ohio and various southern States. In the Academy of Natural Sciences of Philadelphia there is a specimen from Manitoba. In the South and the Southwest it is a very abundant species, a minor pest on Blue-grass.

For the last ten years the species has been becoming more and more abundant around New York City. In 1935 and in subsequent years I found it very common in Yonkers and Mount Vernon. For the last four years it has been steadily on the increase in Connecticut. Here at my summer home in Putnam I can collect from fifty to a hundred specimens any night during August. There are ten or twelve on the window now.

This apparent northward spread of *teterrellus* should be borne in mind. Other species have been doing the same thing during the last twenty years, in the same area. An outstanding example is *Colias eurytheme* Boisd. the Alfalfa butterfly. Even the birds have been doing it; the Turkey Buzzard has been steadily pushing its breeding range up into New York. I was shown a nest in the Catskills three years ago, and found the same site occupied this June. Very recently the abnormal abundance of the Buzzard in the Interstate Park even was commented upon in the newspapers.

I believe that a little checking up will disclose many similar cases. I should be very much interested to hear of any such.—Alexander B. Klots, College of the City of New York, New York.

A NEW GENERIC NAME IN STREPSIPTERA AND DESCRIPTION OF A NEW SPECIES (STREPSIPTERA, STYLOPIDAE).

By Richard M. Bohart, University of California,
Los Angeles, Calif.

It has been called to my attention by R. L. Wenzel that the name *Pseudostylops* which I used for a genus of Strepsiptera had previously been used by Ameghino for a genus of fossil mammals. Therefore, it is necessary to propose a new name.

Eurystylops Bohart, new generic name.
Pseudostylops Bohart, 1941. Univ. California Pub. Ent. 7: 134 (nec *Pseudostylops* Ameghino, 1901).

The two known species of *Eurystylops* are parasitic on the bee genus *Dufourea* and only females and first larvae have been found. The female *Eurystylops* is characterized by its broad cephalothorax, simple mandibles, and narrow basal band. A character of apparently generic value which was not mentioned in the original description is the presence on the ventral side of the thorax of two transverse groups of broadly lens-shaped pigmented spots. The anterior group consisting of 8 to 12 spots in an irregular line halfway between the base of the head and the spiracles is difficult to discern on most specimens. The posterior group consists of 13 to 27 plainly visible spots stretching between the spiracles. These spots may be placoid sensillae or "pore plates," but in any case are distinct from the transparent, supposedly campaniform organs or "pori" of authors, which are present on the ventral side of the thorax of many female stylopids including one of the two known species of *Eurystylops*. I have examined representatives of *Hylecthrus, Stylops, Crawfordia,* and *Halictoxenos,* all genera related to *Eurystylops,* but no spots of the "placoid sensillae" type are to be found.

Eurystylops desertorum Bohart
Pseudostylops desertorum Bohart, 1941. Univ. California Pub. Ent. 7: 134.

This species is known only from the type series of females extracted from specimens of *Dufourea boregoensis* (Michener) collected near Indio, California, March 25, 1937, by G. E. Bohart and the author. In this species there are no evident "pori" and in the four paratypes before me there are 22 to 25 lens-shaped pigmented spots in the spiracular area. The more anterior band of spots is difficultly discernible. All of the spots, which average 7.1 microns in width and 4.5 microns in length, are placed transverse to the main axis of the cephalothorax.

Eurystylops tetonensis Bohart, n. sp.

E. tetonensis is similar to *E. desertorum* in general structure but the former has nearly twice as broad a cephalothorax and bears distinct transparent "pori" just in front of the anterior group of lens-shaped pigmented spots.

> Holotype female. Head and spiracular areas light, remainder of cephalothorax testaceous, basal band fusco-testaceous. Apex of head very broad, somewhat convex; mandibles approximately triangular, with a single large apical tooth. Thorax with a transverse band of about 40 transparent spots or "pori" situated just posterior to the latero-basal angles of the head; with an irregular line of about 10 indistinct lens-shaped pigmented spots bordering the "pori" posteriorly; with another group of 18 pigmented spots (13 to 27 in the paratypes) stretching in an irregular band between the spiracles, the spots averaging 11.5 microns in width and 4.5 microns in length and all the spots placed transverse to the main axis of the cephalothorax. Spiracles large, hardly exceeding the margins; cephalothorax widest just behind the spiracles; basal band 4 times as broad as long. Width of cephalothorax at spiracles 0.90 mm., width at mandibles 0.49 mm., width at base of head 0.67 mm., width at base of cephalothorax 0.73 mm., length from front edge of spiracles to apex 0.48 mm., length of cephalothorax 0.73 mm.

Holotype female and three paratype females, Grand Teton National Park, Wyoming, July, 1937 (J. MacSwain) parasitic on *Dufourea maura* (Cresson) (G. E. Bohart determination). Holotype to be deposited in the California Academy of Sciences, paratypes in the collection of the author.

A six-line note would fill this space. Where is it?

Editor.

ON SOME HOLARCTIC SPHECOID WASPS (ACULEATA, HYMENOPTERA).

By V. S. L. Pate, Cornell University, Ithaca, N. Y.

The close affinity of the Nearctic fauna to that of the Palaearctic Region has long been known. Many forms are common to both regions: some of these are rather ancient species that have been present on this continent since prior to the Pleistocene or some recent glacial epoch, whereas others have been introduced in relatively recent time, often accidentally through the agency of man. Yet too often these Holarctic species are known under different names in the literature of the Old and New Worlds. Several interesting cases of the absolute or probable identity of North American forms with common European species of Sphecoid wasps have been amassed in recent years. Some of these examples are presented below.

Euplilis (*Euplilis*) *clavipes* (Linné)

Sphex clavipes Linné, Syst. Nat., ed. X, p. 569, no. 7 (1758).
Crabro (*Rhopalum*) *clavipes* Kohl, Ann. K. K. Naturhist. Hofmus. Wien, XXIX, p. 336, (1915).

A series of this small rubicolous Pemphilid, hitherto unrecorded from North America, has been examined recently. They agree perfectly with European specimens determined by Kohl as [*Crabro* (*Rhopalum*)] *clavipes* (L.). Although *clavipes* may be adventive. I am inclined to believe that it has long been established in the Pacific northwest and merely been unnoticed hitherto. Moreover, its range in this country and Canada is undoubtedly more widespread than the following records indicate.

Washington: Fish Creek, Mt. Rainier National Park; elevation, 2900 ft.; July 12, 1940 (H. K. & M. Townes); 2 ♂. Ashford, Pierce Co.; elevation, 1775 ft.; August 18, 1940 (H. K. & M. Townes): 2 ♂. Oregon: Cannon Beach, Clatsop Co.; August 9, 1940 (H. K. & M. Townes): 3 ♀. Warrenton, Clatsop Co.; August 8, 1940 (H. K. & M. Townes): 3 ♀. Portland, Multnomah Co.; August 1, 1930 (Murray Canova): 1 ♀. Corvallis, Benton Co.; July 6–9, 1936 (George Ferguson): 1 ♀, 1 ♂. California: Crescent City, Del Norte Co.; August 2, 1940 (H. K. & M. Townes): 2 ♂.

Euplilis (*Corynopus*) *coarctatus* (Scopoli)

Sphex coarctata Scopoli, Entom. Carn., p. 293, no. 778, pl. 42, fig. 778 (1763).

Crabro tibialis Fabricius, Suppl. Entom. Syst., p. 271, no. 27–28 (1798).

? *Rhopalum modestum* Rohwer, Entom. News, XIX, p. 257 (1908); XX, p. 145; p. 324 (1909).

Rhopalum pedicellatum Authors (not of Packard).

The common widespread North American species which apparently has been hitherto known as *Rhopalum pedicellatum* is identical with European specimens determined by Kohl as [*Crabro* (*Rhopalum*)] *tibiale* F[abricius, 1798], i.e., *Euplilis coarctatus* (Scopoli, 1763). This species is common and widespread throughout Europe and Kohl has reported it from as far east as Irkutsk, Siberia. Undoubtedly *coarctatus* is a very early preglacial or interglacial immigrant to North America via the Siberian-Alaska land bridge.

Euplilis (*Corynopus*) *pedicellatus* (Packard)

Rhopalum pedicellatum Packard, Proc. Ent. Soc. Phila., VI, p. 380 (1867).

Lectotype.—♀; West Farms, New York. (James Angus; bred from stems of *Spiraea.*) [Academy of Natural Sciences of Philadelphia.]

This little rubicolous Nearctic form has apparently been largely misunderstood in the past. Superficially it is much like the Holarctic *coarctatus,* but the clypeal lobe of the female *pedicellatus* has a short, rather broad, truncate median tooth, whereas that of *coarctatus* terminates in an acute trigonal tooth.

Crossocerus (*Blepharipus*) *ambiguus* (Dahlbom)

Crabro ambiguus Dahlbom, Dispos. method. Hymen., p. 14 (1842).

Blepharipus parkeri Banks. Ann. Ent. Soc. Amer., XIV, p. 17 (1921).

Crabro (*Blepharipus*) *davidsoni* Sandhouse, Ann. Ent. Soc. Amer., XXXI, p. 1 (1938).

I can find no essential difference between European specimens determined by Kohl as *ambiguus* Dahlbom and Nearctic material of *parkeri* Banks and *davidsoni* Sandhouse, and consequently have relegated the two latter names into the synonymy of the first.

This is a common species throughout northeastern North America, ranging from Quebec to Maryland, and from the Atlantic coast to at least as far west as Chicago, Illinois. Whether *ambiguus* is an ancient and long-established immigrant from the Palaearctic

Region, where it is common and widespread, or a relatively recent introduction cannot be determined at present.

Oxybelus bipunctatum Olivier

Oxybelus bipunctatus Olivier, Encycl. method. Insect., VIII, p. 597 (1811).

This is a relatively common and widespread species throughout Europe and western Asia. Apparently *bipunctatum* has been accidentally introduced recently in the eastern United States, as the following records indicate. Whether it will become firmly established, however, only future collecting will reveal.

NEW YORK: Half Way Hollow Hills, Long Island; June 7, 1936; 1 ♀. Six Mile Creek, Ithaca, Tompkins Co.; August 2, 1937; 1 ♂.

Trypoxylon (*Trypoxylon*) *figulum* (Linné)

Sphex figulus Linné, Syst. Nat., ed. X, p. 570, no. 9 (1758).

Trypoxylon apicalis Fox, Trans. Amer. Ent. Soc., XVIII, p. 142 (1891).

Trypoxylon (*Trypoxylon*) *apicale* Sandhouse, Amer. Midl. Nat., XXIV, p. 156 (1940).

The late Miss Sandhouse, in her recent excellent review of the Nearctic species of *Trypoxylon*, remarks that ". . . *Trypoxylon apicale* is with difficulty separated from the Palearctic species *figulus*." This confirms an opinion I formed a dozen years ago, that the Nearctic *apicale* was identical with, or but racially distinct, from the European *figulum*. Many *Trypoxylon* are rubicolous or xylicolous and more or less semidomiciliary in their habits; some of these have become quite widely distributed indirectly through the agency of man. The distribution given by Miss Sandhouse for *apicale* (Quebec, Maine, New Hampshire, and Massachusetts) suggests that *figulum* is a relatively recent established adventive form in northeastern North America. However, much more investigation of the relationship of the Nearctic to the Palaearctic species of *Trypoxylon* is necessary before this can be definitely proven.

A little four-line filler for this empty space would be wecomed by the Editor.

A SECOND SPECIES OF LOEDELIA R. LUCAS (CLERIDAE, COLEOPTERA).

By A. B. Wolcott, Downers Grove, Ill.

Prof. Charles J. Gahan (Ann. Mag. Nat. Hist. 5, 1910, p. 76), erected the genus *Necrobioides* to receive a *Necrobia*-like Mexican species to which he gave the specific name *mexicana.* The generic name used by Gahan being preoccupied (Fairm. Notes Leyd. Mus. 4, 1882, p. 234; Tenebrionidae, Sumatra) R. Lucas (Arch. Naturgesch. 1920, p. 380), proposed the term *Loedelia* in its stead.

Several years ago the writer received through the kindness of the collectors and donors Drs. H. E. Hinton and R. L. Usinger two specimens of a very beautiful and distinct new species, which can be referred only to the genus *Loedelia.*

Loedelia magnifica Wolcott sp. nov.

Cyaneous above and beneath, rather shining, moderately densely clothed with short, erect black hairs, general form and size of *Necrobia violacea* L., a large quadrate antemedian orange-colored maculation on each side, extends from lateral margin two-thirds distance to suture, sutural ends of maculations rounded, these maculations thus forming a transverse fascia very widely interrupted at the suture. Head wide, the rather prominent eyes moderately coarsely facetted, surface coarsely densely punctured, front with a few white hairs, palpi black, apical segment of maxillary pair very shining. Antennae 11-segmented, scape and five basal segments of funicle flavous, remainder of segments piceous, claws dull piceous, structure very much as in the genus *Phymatophaea* Pascoe, the clava here is, however, slightly more compact. Pronotum coarsely, sparsely punctured, subapical transverse line very feebly impressed, a small fovea each side at base. Elytra feebly, broadly tumid at base, punctures coarse, rather deep and scattered, punctures in great part confluent, punctures of apical portion less dense. Abdomen coarsely, densely, confluently punctured. Legs cyaneous, femora viridescent, coxae and femora narrowly at base, flavous. Length 5.6 mm.

Holotype ♂; allotype ♀, both taken at Tejupilco, Temescaltepic, Mexico, June, 1933, in collection of the author.

To judge from Gahan's description *mexicana* differs from the new species by its somewhat larger size, in being violaceous in color, by the antennae and legs being entirely black and by the elytra devoid of color ornamentation.

STUDIES ON SIPHONAPTERA OF EASTERN NORTH AMERICA.

By H. S. Fuller, Boston, Mass.

Several valuable collections of alcoholic specimens of fleas have recently come to the writer's attention. Those from the New England states are included in a paper published elsewhere on the fleas of that region. A collection sent by Dr. G. E. Wallace, Carnegie Museum, Pittsburgh, contained a good series of *Atyphloceras bishopi* Jordan and *Catallagia borealis* Ewing, in addition to other species. From F. C. Goble, Delmar, N. Y., was received a collection containing two examples of *Epitedia faceta* (Rothschild).

Several previously unpublished records in the collection of the Museum of Comparative Zoölogy are also included in this paper. The writer takes this opportunity to express his appreciation to Dr. J. C. Bequaert for his encouragement and guidance in the writer's studies of fleas.

Family Hectopsyllidae.

Echidnophaga gallinacea (Westwood). Florida: Gainesville, March 13, 1937, off *Sylvilagus* sp., 1 female (H. B. Sherman); January 20, 1936, off cat, 1 male and 11 females (F. N. Young).

Family Pulicidae.

Pulex irritans Linnaeus. Florida: Alachua Co., January 24, 1941, off *Sylvilagus f. floridanus,* 1 female (W. A. McLane). Indiana: Indianapolis, 1941, off mongrel dogs, 2 females (J. H. Sandground). Virginia: Damascus, Washington Co., August 1941, off man, 1 male (S. T. Brooks).

Cediopsylla simplex (Baker). Florida: Alachua Co., January 24, 1941, off *Sylvilagus f. floridanus,* 4 males and 3 females (W. A. McLane). Gainesville, March 13, 1937, off *Sylvilagus floridanus mallurus,* 1 male and 1 female (H. B. Sherman). Michigan: Swan Creek Expt. Sta., Allegan Co., 1939, off cottontail rabbit, numerous specimens (A. O. Haugen, no. 91). New Jersey: Princeton, off European rabbit, 1 male, and off *Sylvilagus floridanus mallurus,* 1 male (R. T. Hatt). New York: East Greenville, December 6, 1941, off gray fox, 1 female. Medway, November 25, 1941, off same host, 1 male and 2 females; December 2, 1941, off same host, 2 males and 1 female. Surprise, November 29, 1941, off same host, 3 females. Smith's Corners, December 9, 1941, off same host, 1 male and 3 females. Medway, November 29, 1941, off red fox, 22 males and 22 females. Dormansville, November 24, 1941, off same host, 5 females. East Berne, November 21, 1941, off same host, 4 females. All of these specimens from New York State were received from F. C. Goble. One of the males from Medway taken off gray fox is abnormal in that some of the spines of the right genal comb are deflected upward and forward instead of pointing posteriorly. This observation was made before the specimens had been treated in any way; therefore it is probably a developmental defect and not an artefact. PENNSYLVANIA: Centre Co., March 25, 1942, off *Sylvilagus floridanus mearnsi,* 2 males and 4 females (P. F. English).

Ctenocephalides felis (Bouché). INDIANA: Indianapolis, 1941–42, off cat, 1 male and 2 females; off mongrel dogs, numerous specimens (J. H. Sandground). NEW YORK: New York City, Zoological Park, 1939, off White-nosed Coati (*Nasua nasua*), 1 male and 3 females (C. M. Herman). PENNSYLVANIA: Pittsburgh, September 11, 1932, in a basement, 2 males and 5 females (Rhodes).

Ctenocephalides canis (Curtis). INDIANA: Indianapolis, 1941–42, off mongrel dogs, numerous specimens (J. H. Sandground).

Family DOLICHOPSYLLIDAE.

Trichopsylla lotoris Stewart. NEW YORK: East Greenville, December 6, 1941, off gray fox, 1 female (F. C. Goble). PENNSYLVANIA: Near Findleyville, December 1941, off *Procyon lotor,* 4 males and 5 females (D. M. Riddle). These represent new locality records for this species. The gray fox is a new host record, and the raccoon, *Procyon,* is believed to be the usual host, although as yet the species of flea is too rare in collections to permit of much generalization.

Ctenophthalmus pseudagyrtes Baker. FLORIDA: Marianna, off *Peromyscus polionotus,* 1 male (C. C. Goff). MICHIGAN: Cheboygan Co., July 9, 1937, off *Peromyscus leucopus noveboracensis,* 1 female (L. R. Penner). NEW JERSEY: Bergenfield, August 22, 1928, off *Microtus pennsylvanicus,* 2 males and 1 female (F. M. Schott). Jamesburg, April 5, 1924, in mouse nest under board, 1 female (F. M. Schott). NEW YORK: Uniontown, in mouse nest under stone, 1 male (F. M. Schott). Surprise, December 23, 1941, off muskrat, 1 female (F. C. Goble). WEST VIRGINIA: Blister Pine Run, near Cheat River Bridge, Randolph Co., November 9–10, 1941, off *Clethrionomys carolinensis,* 1 female; and off *Microtus* sp., 1 male (G. E. Wallace, nos. 61 and 62). This species is one of the commonest fleas of the eastern United States.

Oropsylla arctomys (Baker). New York: Clarksville, November 10, 1941, off gray fox, 1 male. Surprise, November 29, 1941, off same host, 1 female. Medway, December 2, 1941, off same host, 1 female; December 29, 1941, off red fox, 2 males and 3 females. Dormansville, November 24, 1941, off same host, 4 males and 2 females. East Berne, November 21, 1941, off same host, 1 male and 4 females. (All from F. C. Goble). West Nyack, September 26, 1931, off *Marmota monax rufescens* (J. Bequaert).

Odontopsyllus multispinosus Baker. Michigan: Swan Creek Expt. Sta., Allegan Co., 1939, off cottontail rabbit, 4 males and 3 females (A. O. Haugen, no. 91). New Jersey: Princeton, off domestic European rabbit, 1 female (R. T. Hatt). Pensylvania: Centre Co., March 25, 1942, off *Sylvilagus floridanus mearnsi*, 1 male and 1 female (P. F. English).

Ceratophyllus riparius Jordan and Rothschild. Michigan: Cheboygan Co., July 1935, in nest of *Riparia riparia*, 1 male and 1 female (L. R. Penner). New York: Gardiner's Island, June 1, 1924, in nest of same host, 1 female (F. M. Schott).

Opisodasys pseudarctomys (Baker). West Virginia: Blister Pine Run, near Cheat River Bridge, Randolph Co., November 9, 1941, off *Glaucomys sabrinus fuscus*, 1 female (G. E. Wallace, no. 60).

Orchopeas wickhami (Baker). Florida: Gainesville, December 15, 1939, off fox squirrel, 1 female (J. C. Mason). Michigan: Cheboygan Co., June 27, 1937, found in rubbish, 1 male (L. R. Penner). New York: Smith's Corners, December 9, 1941, off gray fox, 1 female (F. C. Goble). New York City, Zoological Park, 1939, off *Sciurus carolinensis leucotis*, numerous specimens (C. M. Herman). Huntington, Long Island, off same host, 3 females (F. M. Schott). Pennsylvania: Near Carter Camp, Potter Co., November 5, 1941, off *Sciurus carolinensis leucotis*, 1 female (Mrs. P. Wible). West Virginia: Spica, Droop Mt. Park, Pocahontas Co., November 2, 1940, off same host, 1 male and 1 female (L. W. Wilson). Five miles south of Moorefield, Hardy Co., October 18, 1941, off *Sciurus niger neglectus*, 1 male and 2 females (L. W. Wilson).

Orchopeas leucopus (Baker). Michigan: Cheboygan Co., July 9, 1937, off *Peromyscus leucopus noveboracensis*, 1 male and 3 females (L. R. Penner). New Jersey: Princeton, off same host, 1 male (C. B. Worth). New York: North Beach, Long Island, October 24, 1926, off same host, 2 females (F. M. Schott). Surprise, November 21, 1941, off weasel, 2 females (F. C. Goble).

West Virginia: Mathias, March 10, 1941, off *Peromyscus leucopus noveboracensis,* 2 females (L. W. Wilson). Moorefield, Hardy Co., April 28, 1940, off same host, 1 female (J. E. Friedel and L. W. Wilson).

Megabothris vison (Baker). Michigan: Cheboygan Co., July 9, 1937, off *Peromyscus leucopus noveboracensis,* 1 female (L. R. Penner). This flea has not been previously recorded from *Peromyscus.* The commonest hosts are the red squirrel and the weasel.

Nosopsyllus fasciatus (Bosc). New York: Huntington, Long Island, under floor of chicken house, 1 male and 2 females (F. M. Schott). Ohio: Cleveland, December 1941, off rats, 5 males and 2 females (V. G. Dethier).

Family HYSTRICHOPSYLLIDAE.

Atyphloceras bishopi Jordan. West Virginia: Blister Pine Run, near Cheat River Bridge, Randolph Co., November 9–10, 1941, off *Microtus* sp., 1 female (G. E. Wallace, no. 62); same locality and date, off *Clethrionomys carolinensis,* 13 males and 14 females (G. E. Wallace, no. 61). This record is interesting inasmuch as it is the first record published, to the best of my knowledge, since Jordan's original description in 1933, based on two specimens collected in New York state. Also *Clethrionomys* is a new host.

Stenoponia americana (Baker). Pennsylvania: Easton, December 22, 1941, off *Blarina brevicauda,* 1 male (O. Pearson).

Peromyscopsylla hesperomys (Baker). Michigan: Cheboygan Co., July 9, 1937, off *Peromyscus leucopus noveboracensis,* 1 male (L. R. Penner). West Virginia: Hinch, Mingo Co., August 7, 1940, off same host, 2 males and 1 female (L. W. Wilson). Mathias, March 10, 1941, off same host, 1 female (L. W. Wilson).

Peromyscopsylla catatina (Jordan). West Virginia: Blister Pine Run, near Cheat River Bridge, Randolph Co., November 9–10, 1941, off *Clethrionomys carolinensis,* 2 males and 8 females (G. E. Wallace, no. 61). In addition to these ten specimens are three examples, one male and two females, with atypical genitalia. In all other respects, however, they resemble *P. catatina,* and for the present I prefer to regard them as examples of variation.

Doratopsylla blarinae C. Fox. Pennsylvania: Easton, December 22, 1941, off *Blarina brevicauda,* 1 female (O. Pearson).

Epitedia wenmanni (Rothschild). West Virginia: Blister Pine Run, near Cheat River Bridge, Randolph Co., November 9–10, 1941, off *Clethrionomys carolinensis,* 2 males and 1 female (G. E. Wallace, no. 61). Mathias, March 10, 1941, off *Peromyscus leucopus noveboracensis,* 1 male (L. W. Wilson).

Epitedia faceta (Rothschild). NEW YORK: Rensselaerville, December 5, 1941, off weasel, 2 females (from F. C. Goble). This provides the third authentic record for this species, and the weasel is a new host. Previous records are from Massachusetts (Rothschild, 1915), and from Pennsylvania (Fuller, 1942), both taken off the red squirrel.

Catallagia borealis Ewing. WEST VIRGINIA: Blister Pine Run, near Cheat River Bridge, Randolph Co., November 9–10, 1941, off *Clethrionomys carolinensis,* 5 males and 12 females (G. E. Wallace, no. 61). Two species of *Catallagia* have been described from the eastern United States. *C. borealis* Ewing (March 1929) was based on a unique type female taken off *Microtus p. pennsylvanicus* at Basin Pond, Mt. Katahdin, Maine. *C. onaga* Jordan (September 1929) was based on two males taken off *Blarina brevicauda* at the Adirondack Lodge of the Lake Placid Club, New York. Until now no further records of either species have been published. Fox (1940) stated that "it is unlikely that they are the two sexes of a single species." Jellison and Good (1942) regard *C. onaga* as a synonym of *C. borealis,* but note that "In a recent communication, Dr. Ewing expresses uncertainty of this synonymy." Dr. Ewing has also expressed this uncertainty to me, but I now have evidence that his species is valid and that Jordan's is a synonym. In the above series from West Virginia, the females all agree with *C. borealis* Ewing. The receptaculum seminis differs very little from that of other American species of this genus. The males all agree with *C. onaga* Jordan, and it is reasonable to believe that this series of males and females represents a single species. Therefore, since *C. borealis* Ewing has priority, *C. onaga* Jordan must be suppressed as a synonym.

Family ISCHNOPSYLLIDAE.

Myodopsylla insignis (Rothschild). CANADA: Bala, Muskoka Co., Ontario, off *Myotis lucifugus,* 1 male and 2 females (H. Hitchcock). NEW JERSEY: Hibernia, Morris Co., November 23, 1940, off *Eptesicus fuscus,* 2 males and 6 females (H. Trapido). PENNSYLVANIA: Easton, January 8, 1942, off *Myotis lucifugus,* 3 females (O. Pearson). WEST VIRGINIA: Hardy Co., 5 miles south of Moorefield, June 1, 1941, off *Myotis l. lucifugus,* 1 female (L. W. Wilson).

Sternopsylla texana (C. Fox). FLORIDA: Gainesville, March 22, 1929, off *Tadarida cynocephala,* 3 males and 4 females, and January 17, 1932, off same host, 1 female (all E. T. Boardman); January 2, 1932, off same host, 3 females (H. B. Sherman).

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1942. Notes on a collection of Siphonaptera, mainly from Pennsylvania. Entomological News, *53*, pp. 136–139.

Jellison, Wm. L. and **Good, Newell E.**

1942. Index to the Literature of Siphonaptera of North America. National Institute of Health Bulletin No. 178, pp. 1–193.

A Rare Tenebrionid.—While heading for Oregon on a bus, on June 12, 1941, I had a short, twenty-minute rest-stop at Rock Springs, Wyoming. In spite of the late hour (about 1 : 30 A.M.), I took the advantage of it, and went about 100 yards away from the bus depot in order to search with a flashlight for insects. I went down into a large excavation, and under stones, pieces of wood, paper and the like debris I found about 15 specimens of *Eleodes*. Unfortunately this was all I could collect, since I had to return to the depot.

Sometime later, these specimens along with certain others were submitted for determination to Dr. F. E. Blaisdell, Sr. He found that 10 of them belonged to the rare species *Eleodes perlonga* Blais. The remaining were *E. immunis* Lec.

E. perlonga was described by Mr. Blaisdell in 1909, from the series of 8 specimens, from Wyoming, with no definite locality, and as he stated in a letter to me, since that time he had seen only a single pair from Rexburg, Idaho. The Rock Springs specimens are distributed as follows; 7 in the collection of Mr. Blaisdell and that of California Academy of Sciences, 2 in my own collection, and 1 in the collection of American Museum of Natural History in New York.—BORYS MALKIN, Eugene, Oregon.

BOMOLOCHA BIJUGALIS WLK. AND TOREUTA, GRT. (HYPENINAE, LEPIDOPTERA).

By Alex K. Wyatt, Chicago, Illinois.

Prof. John B. Smith, in his "Revision of the Deltoid Moths" (Bull. 48, U. S. Natl. Mus.), p. 97 (1895), referring to *Bomolocha bijugalis,* mentions the lack of males in the series before him. In 1893 in his "Catalog of Noctuidae" (Bull. 44, U. S. Natl. Mus.), he placed *fecialis* Grt. as a synonym, stating that it was "based on a washed out, faded specimen, which thus looks different." The Barnes & McDunnough list of 1917 and the new McDonnough list of 1938, retain this synonymy, but indicate that *fecialis* Grt. represented the male of *bijugalis* Wlk. Be that as it may, I have been asked repeatedly for males of *bijugalis* and as far as I could ascertain, no authentic males were known, even to such good students and collectors as A. G. Richards, A. E. Brower and Otto Buchholz.

As to *B. toreuta,* Grt., Smith's Revision states that "there is no difference in maculation between the sexes"; yet here again, my friends seem to have no female specimens. The maculation of *toreuta* is generally quite obscured and superficially varies so greatly from that of *bijugalis,* that it seems ridiculous to suggest that the two may be one and the same species. However, I have a male *toreuta* from Florida that shows a transverse posterior line very clearly. The course of this line closely approximates that of *bijugalis.* The specimen is otherwise badly rubbed and further comparison difficult.

On June 22, 1941, my friend Arthur Herz of Chicago, beat a couple of *Bomolocha* larvae from dogwood (*Cornus stolonifera* Michx.) and reared them to maturity. Adults emerged July 9, a male of *toreuta* and a female of *bijugalis.* We had hoped to capture a female of *bijugalis* this year and secure eggs, but were unsuccessful. The case is not proved and will not be, until larvae have been bred from eggs of a known female, through to the imago. However, the food plant has been located and, given the opportunity, the rest should be easy.

Local dates of capture vary considerably; for *bijugalis,* May 30 to June 10 and July 3 to August 30; for *toreuta,* only four records, May 30, July 9, Aug. 24 and Sept. 28. Two broods are indicated.

REMARKS ON THE GENUS GEOCORIS FALLÉN 1814.

By J. R. de la Torre-Bueno, Tucson, Ariz.

Among the numerous genera of the Heteroptera still in chaotic condition, *Geocoris* Fallén 1814 is outstanding. This is strikingly shown in Enumeratio IV: 134–135. Stål lists here 44 species (or descriptions?), of which he was able to key out only 17, among them 4 he there describes. Of the 27 unplaced, one is his own *G. lividipennis,* described from a single specimen in the Signoret collection, and apparently not recognized since 1862—at least not in any publication known to the writer. Two of the keyed species—*G. piceus* Say and *G. tristis* Stål—have been removed to a new genus, *Hypogeocoris* Montandon 1913 (=*Isthmocoris* McAtee 1914), distinguished from *Geocoris* proper by the character employed by Stål in his key cited (*op. cit.,* p. 135), that is, by the equal or subequal first and second segments of the rostrum, the one unequivocal character later used by Montandon and McAtee. Of the 42 remaining species in Stål's list, about 1/3 have been relegated to synonymy. No further systematic treatment of *Geocoris* was apparently undertaken until McAtee in 1914 examined the United States species (Key to the Nearctic Genera and Species of Geocorinae; Pro. Biol. Soc. Wash. XXVII: 125–136); and in 1935 H. G. Barber (Jour. N. Y. Ent. Soc. XLIII: 131–137; New Geocoris from the United States, with Key to the Species) described three new species and keyed a part of them, referring to the McAtee Key of 1914 for the others. Up to Barber's paper, descriptions of *Geocoris* are notable for a paucity of structural characters; even McAtee remarks: "Color is not only extremely variable, but in the Hemiptera at least depends very much on the age of the individual. In using color characters it must also be remembered that albinistic or melanistic forms of any of the species may occur, and that the structural characters, variable as they also are, must be allowed to decide the identification." McAtee uses but few of them; and Montandon in his copious descriptions is equally abstemious. This color basis has given rise to an involved synonymy, a multitude of varieties and the suspension of certain species described by sundry authors.

Appeal is frequently made by some writers to figures as the *sine qua non* of descriptions. It has been pointed out that a figure is exactly as likely to be wrong as a description in words. Certainly, the early figures of insects frequently were pretty pictures and nothing more—the draftsmen did not aim at structural exactness.

But let us examine some figures which apparently aimed at exactness, or truth. Let us examine the figures of *Geocoris* in plates 17 and 18 of the first volume on Heteroptera of Biologia Centrali Americana, which portray 7 species and varieties, one of which, *Geocoris imperialis* described therein (p. 197, pl. 18, fig. 18) is now placed in *Hypogeocoris*. Of those remaining, three are given as "vars.," which leaves three full species. Of the full species, the figure (pl. 17, fig. 27) of *G. lividipennis* Stål is stated to be from the type in the Signoret collection, in the Paris Museum. *G. flavilineus* Stål (pl. 18, fig. 19) is stated to be from "an example received from Dueñas, Guatemala, which apparently agrees in *every respect* (italics mine) with Stål's description" (En. IV: 135). The figure may be taken as authentic for the specimen in question. *G. thoracicus* Fieber 1861 presents a problem. Distant says "Fieber's type, or typical specimen, which I have been afforded an opportunity of examining, agrees closely with my figure 16, which, with figure 15, may be taken as representative of the extreme varietal forms." He then proceeds to remark in general terms on color variations in the species. Now, on the face of the two figures cited, these represent two distinct species, if there is no error in the drawings. Figure 15 differs in *obvious* structural characters from figure 16, which is taken to be the authentic *G. thoracicus* Fieber in view of Distant's remarks cited above. Figure 15 shows a species in which the head with the eyes is *narrower* than the width of the pronotum at the humeri; the anterior tibiae are apically quite expanded, with an *obvious* subapical spine or spur, and about half the posterior tibiae; segment I of the posterior tarsus equals the apical segment with the claws; the pronotum has the discal punctures coarse, except near the anterior margin where they are finer, and with a small impunctate spot at the middle of the base; the clavus is set off by a longitudinal series of punctures along the suture, but none on the clavus proper; the veins of the membrane are obvious. On the other hand, in figure 16 we have a species in which the head with the eyes is wider than the pronotum at the humeri; the anterior tibiae are only moderately thickened, as in others of the genus, and have no apical spur or spine and are more than one-half the length of the posterior tibiae; segment I of the posterior tarsus is subequal to the apical segment with the claws, or slightly shorter; the discal punctures of the pronotum are fine, reaching to the base, the anterior punctures are coarser; the clavus has a median longitudinal row of punctures; and the veins of the membrane are absent. The entire habitus of the two insects is also dissimilar. Now, on the premise of the validity of figures (and of their accuracy), it follows from the preceding contrasting characters, that we have two distinct forms depicted. Figure 15, labelled *G. thoracicus* var. is not the same thing as figure 16. The latter is stated (see above) to agree with the typical specimen; therefore, the former, which differs structurally from it, is a separate form, which for convenience may at this point be given the name of *Geocoris guatemaltecus*. In the writer's view, this is a good species, the type of which is the specimen from which the figure was drawn (fig. 15, pl. 18, *op. cit.*).

Figure 14, labelled "*G. punctipes,* var." appears to be the Mexican form of this widespread species, of which I have a long series.

The specimen from which figure 17, *G. borealis* is drawn is not mentioned, but Distant states that he has examined the form described by Dallas, now in the British Museum, with which his series from Guatemala are of the same form. This is generally considered to be a synonym of *G. bullatus* Say. Distant also redescribed *G. punctipes* (p. 199, fig. 14, pl. 18), because he says: "the few specimens I have examined are all perfectly constant, and cannot well be reconciled with Say's description."

What really emerges from the preceding discussion is the confusion in which the genus stands, because of the many color descriptions in it. As affairs are now, worldwide, a true revision of this genus is impossible at this time. This note, therefore, is nothing but comment in an attempt to clarify Distant's work for future definite findings.

To recapitulate, Distant actually figures six species of the genus *Geocoris,* one of which, so far as the literature seems to go, is known only from the single type—namely, *Geocoris lividipennis* Stål. The others are: *G. thoracicus* Fieber, *G. borealis* Dallas, *G. punctipes* Say, *G. flavilineus* Stål; and the supposed variety of *G. thoracicus* Fieber, here termed **Geocoris guatemaltecus** n. sp.

With regard to *G. flavilineus* Stål, this is a perfectly distinct species *structurally*. The figure (fig. 19, pl. 18, *op. cit.*), shows, however, something seemingly unusual in the genus, which is the complete absence of any sutures in the smooth head, including the longitudinal sulcus of the tylus and the finer one going up from it up to the vertex.

PROCEEDINGS OF THE SOCIETY.

Meeting of May 14, 1942.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on the 14th of May 1942. The meeting was called to order at 8:00 P.M. by president Wm. T. Davis.

Members in attendance were Messrs. F. T. Naumann, Otto Buchholz, R. R. McElvare, George P. Engelhardt, Father Joseph Assmuth, and Albro T. Gaul. Visitors included Geo. E. Sanders, Wm. Dunn, Dr. J. Forbes and Dr. & Mrs. C. Goodnight.

Minutes of the preceding meeting were read and approved. The treasurer remarked that we were able to meet our obligations for the first half of 1942 but that the future might not be too prosperous.

Mr. Davis remarked upon the death of Dr. Raymond Ditmars, Dr. Raymond Osburn, and Alonzo Davis.

Mr. Davis demonstrated some living colonies of *Gibbium* and *Mezium.* These beetles are quite rare. They feed largely on dried meats. They were first found in N. Y. by Mr. Davis in the N. Y. Produce Exchange in 18??.

Mr. Engelhardt exhibited an unknown *Catocala* which he captured in Mexico City in January 1942.

Mr. Naumann showed a "lubber" grasshopper of the genus *Ramola* from Florida.

Father Joseph Assmuth, the guest speaker, delivered the evening's lecture on "Termites."

In this part of the country we have only one species of termite, *Reticulotermes flavipes,* although there are about 250 species throughout the world.

All termite nests have many guests. The tropical mound builders have more guests than any other forms.

The *flavipes* nests are usually out of doors. The foraging workers gain entrance to buildings through sills, sleepers, and timbers in contact with the ground. Most termites eat only the spongy parts of wood, but may often eat through the annular rings of soft wood.

Swarming of young queens and males occurs periodically. Mating takes place on the ground. Most of this brood is killed by predators. After the establishment of the new colony, the first young are workers.

Although they may occur in live trees, termites never eat the live wood; they consume morbid tissue only. They have been known to eat even paper and to gnaw through tinfoil.

Besides the workers (which may be male or female) and the king and queen, there are soldiers, which have developed heavy mandibles, nasuti whose function is to eject an acrid saliva upon enemies, and accessory queens, without wings, who function when the queen mother dies.

Our termites have been in this area for many centuries although they were first recognized in 1873. Introduction through commercial vessels is improbable as too few colonies could survive to account for our present wide spread population.

The best termite protection is copper sheathing under sills and sleepers. Daubing their means of access with tar and asphalt is also a help.

The tropical mound builders often build 8-ft. hills constructed of dirt and cemented with saliva. Queens of these colonies may live for 12 years, soldiers and workers from 8 to 10 weeks.

Mound builders raise fungus gardens to eat. A rare case was observed where 6 queens lived in one nest.

In India there is a belief that the eating of termite queens is good for consumption.

Father Assmuth concluded his lecture by demonstrating specimens.

A. T. Gaul,
Secretary.

Special Meeting of June 11, 1942.

A meeting of the Brooklyn Entomological Society was held at 401 Washington Ave., Brooklyn, on June 11, 1942. Mr. Wm. T. Davis called the meeting to order at 8 P.M. Members in attendance were: F. T. Naumann, Otto Buchholz, H. J. Deitz, R. R. McElvare, Edwin W. Teale, Dr. Otto Risch, Dr. G. S. Tulloch and A. T. Gaul.

The regular order of business was suspended. The death of our good friend and Treasurer, Mr. George P. Engelhardt, was officially recorded and all the members present expressed their very deep sorrow.

A committee consisting of Mr. Teale and Mr. Gaul was appointed to prepare a biographical article on Mr. Engelhardt for insertion in the Bulletin. Dr. Tulloch, Mr. Davis and Mr. McElvare were appointed a committee to draft suitable resolutions on Mr. Engelhardt's death for presentation at the next meeting of the Society.

Mr. Rowland R. McElvare was duly elected Treasurer and Mr.

Edwin W. Teale was elected a member of the Publication Committee.

Mr. McElvare pointed out the fact that many members resided at a distance from Brooklyn which made it difficult at times to get a quorum to conduct the Society's business. In accordance with the by-laws, proposed amendments to articles II and III of the by-laws were presented, reducing the size of quorums and making other changes to expedite the business of the Society. The proposed amendments were approved for presentation and adoption at the next meeting of the Society.

The meeting adjourned at 9:40 P.M.

A. T. Gaul,
Secretary.

Meeting of October 15, 1942.

A regular meeting of the Brooklyn Entomological Society was held in the Brooklyn Museum on Oct. 15, 1942. The meeting was called to order at 8:00 P.M. by president Wm. T. Davis. Members present were: W. T. Davis, J. M. Sheridan, E. W. Teale, Otto Buchholz, D. Sherry, Dr. G. S. Tulloch and A. T. Gaul. Visitors included Miss Deitz and Mr. J. W. James.

Minutes of the preceding meeting were read and approved.

The following resolutions on the death of Mr. Engelhardt were read by Dr. Tulloch and were unanimously approved by the society:

> On Sunday, May 24, 1942, George Paul Engelhardt passed away.
>
> For more than thirty years he was a member of the Brooklyn Entomological Society and as one of its principal officers gave unselfishly of his time to the best interests of the Society and of American entomology generally.
>
> Acquainted at first hand with the varied faunal life of the United States, he was a naturalist of broad experience. He was particularly gifted as a field entomologist and in the Aegeridae, his chosen group, a recognized authority.
>
> He embodied in his home and family life the spirit of gentleness and devotion, and in his modesty, his quiet dignity, his sympathetic understanding and encouragement of youth he stands as the type of man esteemed by us all.

We are deeply indebted to him for his effective service to the Society and feel his loss very keenly.

Therefore, Be it Resolved that the members of the Brooklyn Entomological Society record their profound sorrow at his death, and be it further

Resolved, That these resolutions be spread upon our minutes and that a copy be presented to his family.

George S. Tulloch
Rowland R. McElvare
Wm. T. Davis
Albro T. Gaul
Edwin Way Teale

The Treasurer rendered a satisfactory report and discussed possible future income from publication now on hand. He was empowered by vote of the society to decide whether the society should insure its publications and records now stored in the Brooklyn Museum.

A report of the publication committee was read and approved.

Mr. Edwin W. Teale was elected the society's delegate to the Council of the N. Y. Academy of Sciences.

The Secretary was instructed to address a letter to the Long Island University Biology Department, asking any members who might be interested to attend our meetings.

Mr. Bueno nominated Dr. Carlos P. Porter, of Santiago, Chile, for honorary membership in the society. Dr. Porter was unanimously elected.

The society approved amendments to articles II and III of our by-laws, as proposed during the meeting of June 11, 1942, as follows:

Article II. shall be amended to read:

Section 1. The affairs of the Society shall be managed by an Executive Committee of not less than seven, which shall consist of the President, Vice President, Treasurer, Secretary and three other members. They shall hold office until the next annual meeting of the Society following their election, or until their successors are elected. Vacancies in the Executive Committee shall be filled by vote of the remaining members of the Committee, subject however to the pleasure of the Society.

The Executive Committee shall have charge of all the property of the Society and transact all business relating to the Society not otherwise provided for.

Three members of the Committee shall constitute a quorum, which shall include at least one of the officers designated above.

Section 2. The officers of the Society shall be a President, a Vice President, a Treasurer, a Secretary, and such other officers as may be deemed necessary; all of whom together with the three general members of the Executive Committee shall be elected at the annual meeting and serve until the next annual meeting or until their successors are elected. Vacancies by death, resignation or otherwise shall be filled by the Executive Committee for the unexpired term only, and subject to the pleasure of the Society. In case for any reason, officers cannot be elected at the annual meeting, they may be elected at the next or any future stated meeting and the officers of the preceding year shall hold over until their successors are elected.

Section 3. The President shall preside at the meetings of the Society and perform all other duties appertaining to that office. He shall be ex officio chairman of the Executive Committee and a member of all committees.

Section 4. The Vice President shall, during the absence of the President, have all the duties and privileges of the President, and shall act as assistant to the President.

Section 5. Treasurer shall have charge of and shall be authorized to receive all moneys belonging or due the Society, and shall pay all proper claims against it. He shall have power to deposit moneys in any banking institution selected by the Executive Committee, in the name of the Society and shall have power to draw checks, sign receipts and do all necessary acts relating to the proper management and care of the moneys of the Society. He shall keep an accurate record of his transactions in a book, which shall be the property of the Society and shall always be open to the inspection of members and he shall report regularly to the Executive Committee.

Section 6. The Secretary shall keep a book containing an accurate record of the transactions of the Society, and shall also keep a book containing a record of the transactions of the Executive Committee. These books shall be the property of the Society and shall always be open to the inspection of members.

Section 7. The members of the Society may also elect any of its members distinguished by long service, or material benefits, to any office, in honor.

Article III. shall be amended to read:

Section 1. The stated meetings shall be held on the first Thursday following the second Tuesday of each month. The stated meeting in January shall be the annual meeting.

Section 2. Special meetings may, and on the written request of five members, shall be called by the President at any time, at least three days' notice thereof being sent to each member at his last known address.

Section 3. Five members shall constitute a quorum for the transaction of business.

Section 4. The order of business at stated meetings shall be as follows:

1. Reading and action on minutes of the previous meeting.
2. Reports of officers and committees.
3. Proposals and elections to membership.
4. Unfinished business.
5. New business.
6. Scientific discussion.
7. Adjournment.

Section 5. At the annual meeting the election of officers shall be the first matter for consideration under the head of new business.

Section 6. At any stated meeting prior to the annual meeting the President shall appoint a nominating committee of three, who shall endeavor to ascertain the wishes of members regarding the choice of officers and members of the Executive Committee and report their recommendations at the annual meeting. Such report shall come as last under the order of business, reports of officers and committees.

Mr. Teale discussed the possibility of the society issuing identification cards to members. Identification is often necessary in the field on Long Island near many military areas.

The summer experiences of members emphasized the poor collecting season. Dr. Tulloch noted the excellent mosquito collecting season on Long Island. He recalled that *Aëdes cantator* and *A.*

sollicitans were very abundant. He has also been working with midges of the Dixidae. Mr. Deitz showed a few Catocalas and an interesting melanotic variety. Mr. McElvare mentioned that he has again collected *Schinia tuberculum* on the aster *Chrysopsis falcata.* It has been taken from one particular field since 1918. Mr. Teale reported that he observed a preying mantis eating a dead short-tailed shrew. He also noted that the immature mantes can see their prey at least eight feet distant. Mr. Gaul showed some photos of mosquitoes and caterpillars.

The meeting adjourned at 9:35 P.M.

A. T. Gaul,
Secretary.

Meeting of November 12, 1942.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on November 12, 1942. The meeting was called to order at 8 P.M. by president Wm. T. Davis.

Members present were J. M. Sheridan, Wm. T. Davis, Edwin Way Teale, Otto Buchholz, Dr. G. S. Tulloch, F. T. Naumann, R. R. McElvare and A. T. Gaul. Dr. Herman T. Spieth was a visitor.

Minutes of the preceding meeting were read and approved.

It was remarked that a second volume of "North American Cicadas" has been compiled from the papers of Wm. T. Davis. It comprises 18 papers from 1932 to 1942.

The speaker of the evening was Dr. Herman T. Spieth whose subject was "The Systematics of the *Stenonema interpunctatum* Complex."

In 1933 the genus *Stenonema* was erected to separate a group of American mayflies from their European relatives. The members of this genus are found from the Mississippi drainage system eastward. They inhabit rivers, permanent streams and lakes.

In 1939 Thomas Say described *S. interpunctatum.* Subsequent species were described: in 1853—*S. canadense;* 1910—*S. carolina;* 1914—*S. frontale* and in 1933—*S. heterotarsale.* In 1935 seven new species were described: *S. gildersleevi; candidum; conjunctum; majus; ohioense; pallidum* and *proximum.* All of the types except those of *interpunctatum* and *carolina* were found in formerly glaciated areas of the United States.

By this time it was difficult to determine which were valid species and in many instances a specimen could not be determined with any certainty.

All the types of *Stenonema* species were studied. *S. interpuncta-*

tum, S. carolina and *S. gildersleevi* were easily separated. All the others approximated *S. interpunctatum.*

Former characteristics upon which the species were based were, the lengths of the first and second tarsal joints of the male; coloration, size, and the male genitalia.

The statistical approach was used in Dr. Spieth's study, based upon wing length, tarsal joints and abdominal color. The statistical method employed consisted of finding the arithmetic mean of the measurements; the standard of deviation (from which may be estimated the largest and smallest individuals possible in a group) and the coefficient of variation.

From the measurements on the Stenonema group the following interpretation has been made: *S. interpunctatum* lived south of the glaciers in the Mississippi valley. As the ice melted out very quickly in the Ohio and Wabash valleys, the *interpunctatum* stock moved north into the open areas. From this group the subspecies *S. canadense* developed.

Along the Alleghennies *S. frontale* lived south of the glaciers. The ice melted slowly along the eastern mountains and the *S. frontale* stock moved northward very slowly. Apparently the subspecies *heterotarsale* is derived from *frontale.*

Thus the *interpunctatum* complex consists of the species *carolina, gildersleevi,* and *interpunctatum. S. interpunctatum* in turn consists of four subspecies: i.e. *interpunctatum, frontale, canadense* and *heterotarsale.*

There are indications that this general movement of life south of the glaciers may hold true for many aquatic forms.

The meeting adjourned at 9:40 P.M.

A. T. GAUL,
Secretary.

MEETING OF DECEMBER 10, 1942.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on December 10, 1942. The meeting was called to order at 8:00 P.M. by President Wm. T. Davis.

Members present were R. R. McElvare, Edwin Way Teale, Otto Buchholz, F. T. Naumann, Wm. T. Davis and A. T. Gaul. Visitors included Mr. & Mrs. Rodney Ward, Mr. & Mrs. Max Kisliuk, Jr., Mrs. A. Droste, Miss C. Bertine, Mr. & Mrs. F. L. Cadman, Mr. Samuel Snodgrass, Jr. and Mrs. & Miss Tilton.

Minutes of the preceding meeting were read and approved. The treasurer submitted a satisfactory report and discussed the copyright of Böving and Craighead's work.

Mr. Davis appointed the following members to the nominating committee for the annual meeting in January: Mr. Buchholz, Sheridan and Naumann.

Mr. Edwin Way Teale presented a discussion on "The Ecology of the Indiana Dunes" with kodachrome illustrations.

At the southern tip of Lake Michigan, dunes have been formed by the action of waves and prevailing winds. This area contains various plant and animal pockets or zones. Cacti found nowhere else in the country, except in the far southwest, grow here. The most primitive plants and the most highly developed species can be found in the flora.

The zones of life begin with the lake beach. This is followed by the skirts of the dunes with marram grass and sand cherries. Then come the dunes themselves and farthest from the shore are the swamps and tamarack bogs. Each zone has its own peculiar flora and fauna.

Because these areas have, in compact form, such varied forms of wildlife, scientists have been studying the region for years. Victor Shelford's "Animal Communities of Temperate North America" and H. G. Wells' "The Science of Life" devote many pages to studies made in the dune area.

The slides showed evidences of the battle of the vegetation to gain a foothold in the sand, and the battle of the wind in shifting the sand about.

Some dunes are wandering—the wind having conquered the vegetation simply shifts the sand from one place to another. Other dunes are fairly permanent, having been anchored by the roots of the vegetation. In some places the wind has created great "blowouts" through the line of dunes, carrying the sand in an avalanche beyond. In past ages such drifting sand has covered whole forests. As the sand gradually moves on in later years, the gaunt exposed tree trunks appear in the wake of the dune.

Insect life of this area is peculiar. The digger wasps burrow in the loose sand. Ants construct their nests at the top of the dunes. Treetops show above the drifted sand, looking very much like bushes. Gray beach spiders run out over the water when pursued. The lecture was closed with a full color picture of the pink katydid indigenous to that area.

The meeting adjourned at 10:00 P.M.

A. T. Gaul,
Secretary.

Insects

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OF THE
BROOKLYN ENTOMOLOGICAL SOCIETY

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J. R. de la TORRE-BUENO, Editor
ALBRO T. GAUL EDWIN W. TEALE

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The Brooklyn Entomological Society

Meetings are held on the second Thursday after the first Tuesday of each month from October to June, inclusive, at the Central Museum, Eastern Parkway and Washington Ave., Brooklyn. The annual dues are $2.00.

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BULLETIN

OF THE

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NEW SPECIES OF PTYCHOPTERIDAE (DIPTERA). PART II.

By Charles P. Alexander, Amherst, Mass.

The first part under this general title was published in 1937 (Bull. Brooklyn Ent. Soc., 32: 140–143). In the present paper I wish to describe two new species from the Pacific Northwestern United States and to furnish records of distribution concerning certain little-known species within the Nearctic fauna. The types of the novelties are preserved in my extensive collection of Tipuloidea.

Ptychoptera townesi sp. n.

General coloration polished black, the scutellum obscure yellow; antennae (male) relatively short; femora yellow, the tips blackened, the amount subequal on all legs; wings with a weak brown tinge, very restrictedly patterned with brown; macrotrichia of cells unusually numerous, including most of cells *C, R* and *M,* and the distal third of cells *Cu* and *A,* in addition to the cells beyond the cord; male hypopygium with the dististyle trilobed, the outer lobe longest, pale; at base of dististyle with a powerful black spine arising from a strong, setiferous basal tubercle.

Male.—Length, about 7.5–8 mm.; wing 8.5–9 mm.; antenna about 4 mm.

Rostrum broadly darkened medially above, the sides obscure yellow, in cases more uniformly darkened; mouthparts yellow; palpi yellow, the terminal segment passing into black. Antennae of moderate length; scape and pedicel dark reddish brown, flagellum black; flagellar segments cylindrical; verticils shorter than the segments. Heat polished black; anterior vertex wide.

Pronotum obscure yellow. Mesonotum polished black, including the parascutella; scutellum obscure yellow; pleuroter-

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gite with a restricted obscure yellow area on cephalic-dorsal portion, behind which is an area of silvery setae. Pleura black, conspicuously gray pruinose, more heavily so on mesepimeron; dorsopleural membrane buffy yellow. Halteres yellow, knobs weakly infuscated. Legs with the fore and middle coxae yellow, the posterior pair blackened, sparsely pruinose; trochanters yellow; femora light yellow, the tips somewhat extensively blackened, including about the distal sixth or seventh; fore and middle tibiae chiefly infuscated, the posterior pair more yellowish, with blackened tips; tarsi black. Wings with a weak brown tinge; prearcular field and costal border more yellowish; very restricted brown seams on cord and at forks of R_{1+2} and R_{4+5}; fork of M_{1+2} scarcely clouded; veins brown, more yellow in the brightened basal and costal portions and including vein Cu_2. Macrotrichia of cells unusually abundant and well-distributed, involving not only the cells beyond cord, as is common in the genus, but also extensive series for virtually the whole length of cells *C, R* and *M,* as well as the distal third of cells *Cu* and *A.* Venation: *r-m* about two-thirds its length before fork of *Rs,* the basal section of the latter about three times *r-m* alone; fork of M_{1+2} small.

Abdomen black, including the hypopygium; apex of outer lobe of dististyle of latter whitened. Male hypopygium of moderate size. Ninth tergite transverse, the caudal margin with a deep U-shaped notch, the lateral lobes stout, their tips obliquely truncated, with an inwardly-directed blackened lobule at the inner mesal angle. Dististyle conspicuously trilobed, the outer lobe longest, flattened. the two inner lobes darkened, more or less oval in outline; at base of style with a very strong, powerful, blackened spine, directed inward, its basal tubercle stout, provided with several scattered setae.

Habitat.—Washington.

Holotype, ♂, Elbe, July 13, 1940 (H. & M. Townes). *Paratopotype,* ♂.

I am privileged to name this interesting species in honor of Dr. and Mrs. Henry K. Townes, who collected the type material. The closest ally is *Ptychoptera pendula* Alexander, of the central and northern Rocky Mountains, which has the head and thorax similarly highly polished black. This latter species differs from the present fly in the more restricted macrotrichia of the cells of the wing and in the very different structure of the male hypopygium, especially of the dististyle.

Ptychoptera pendula Alexander.

Described from various stations in Colorado. Additional records:

British Columbia: Fernie, June 5, 1934 (H. B. Leech).

Utah: Lodge Forest Camp, Logan Canyon, altitude 4,800 ft., June 30, 1942 (C. P. Alexander).

Ptychoptera metallica Walker.

Described from St. Martin's Falls, Albany River, Hudson Bay. According to Dr. James Fletcher (in Aldrich's, Catalogue of the North American Diptera, p. 66; 1905), this station is now called Martin's Falls and is located at Latitude 51° 30′; Longitude 86° 30′, which is about 200 miles north of the northern arch of Lake Superior. Later the species was recorded from various stations in Alberta. The following is the first record for the United States:

Minnesota: Cushing, Morrison Co., June 26, 1940 (H. D. Pratt).

Ptychoptera sculleni sp. n.

General coloration yellow, the praescutum with three separate black stripes, the lateral pair prolonged backward onto the scutal area; pleura yellow, patterned with black, especially on the ventral sclerites; wings brownish yellow, restrictedly patterned with brown; male hypopygium unusually large and complex, the very elongate lobes of the tergite and the branches of the dististyle whitened, contrasting with the blackened remainder of the hypopygium.

Male.—Length about 10.5–11 mm.; wing 9.5–10.5 mm.; antenna about 6–6.5 mm.

Female.—Length about 13 mm.; wing 11.5 mm.; antenna about 3.5 mm.

Rostrum and palpi yellow, the terminal segment of the latter infuscated. Antennae with scape and pedicel yellow; in male, the first segment of flagellum yellow basally, darkened at apex, in female uniformly darkened; succeeding flagellar segments uniformly brownish black; flagellar segments cylindrical, the verticils much shorter than the segments in male, subequal to the segments in female. Head black above, the surface subnitidous; anterior vertex wide.

Pronotum light yellow. Mesonotal praescutum and scutum yellow, with three black stripes that are distinctly separated by the narrow yellow interspaces; lateral stripes constricted and impressed before midlength, on the scutum bent more toward the midline, leaving the central area of the latter yellow; scutellum yellow; postnotum yellow, the posterior third or more of the mediotergite covered by two large confluent blackened areas; pleurotergite yellow, narrowly blackened on ventral portion above the halteres. Pleura yellow, extensively blackened on ventral portion, including the sternopleurite and ventral epimeral region; smaller but conspicuous black spots on propleura, anepisternum and along the suture between the anepisternum and pteropleurite. In the female, the ventral black pleural areas are even more extensive, involving almost all the sternopleurite and much more of the ventral mesepimeron. Halteres with stem yellow, knob infuscated. Legs with all coxae uniformly pale yellow; trochanters yellow; femora yellow, the tips narrowly blackened, the amount subequal on all legs; tibiae and basitarsi obscure yellow, their tips darkened; terminal tarsal segments uniformly blackened. Wings brownish yellow, the prearcular field and costal border slightly more yellow; cord very narrowly seamed with brown; small brown spots at forks of *Sc*, R_{4+5} and M_{1+2}; veins brown, more yellow in the brightened fields. Venation: *r-m* some distance before fork of *Rs*, opposite or before the fork of *M*.

Abdominal tergites (male) obscure brownish yellow, the basal and intermediate segments ringed with brown; in the holotype, the dark color is more extensive, restricting the paler color; sternites more uniformly yellow; male hypopygium black, the outer tergal lobes and the dististyle abruptly whitened. Male hypopygium very large. Ninth tergite with a deep V-shaped notch, the lateral lobes produced caudad and ventrad into very long, pale, fingerlike points; viewed from the side these lobes are seen to be more expanded at their tips and with a conspicuous ventral tooth at near midlength. Dististyle very complex, pale basally, deeply trilobed; a long slender lobe directed chiefly dorsad, a smaller curved lobe directed mesad, and a more flattened blade directed ventrad, all whitish in color. Ninth sternite conspicuously tumid, more or less hood-shaped. In the female, the abdominal tergites are blackened, the caudal borders very narrowly pale; sternites obscure yellow.

Habitat.—Washington, Oregon.

Holotype, ♂, Elbe, Washington, July 18, 1940 (H. & M. Townes); Alexander Collection. *Allotopotype*, ♀, July 15, 1940; U.S.N.M. *Paratypes*, 1 ♂, Alsea, Oregon, May 23, 1931 (H. A, Scullen); Department of Entomology, Oregon Agricultural Experiment Station, Corvallis; 1 ♂, 1 ♀, Cascadia, Oregon, August 11, 1924 (H. A. Scullen).

I am very pleased to name this unusually distinct *Ptychoptera* in honor of Professor Herman A. Scullen, Department of Entomology, Oregon Agricultural Experiment Station, who has added very materially to our knowledge of the Oregon Tipuloidea. The species is very distinct from all others previously defined, differing especially in the very peculiar structure of the male hypopygium.

Bittacomorphella sackeni (Röder)

Described from Nevada. The following records indicate the range of the species.

British Columbia: Queen Charlotte Island; Stanley Park, Vancouver, flying beside a stream, September 3, 1930 (H. B. Leech).

Washington: Mount Rainier, July 21, 1940 (H. & M. Townes); Ashford, August 18, 1940 (H. & M. Townes).

Oregon: Hood River, June 6, 1917 (F. R. Cole); Alsea Mt., Benton Co., May 26, 1934 (H. A. Scullen); Cascadia, August 12, 1924 (H. A. Scullen).

California: Fieldbrook, May 18, 1903 (H. S. Barber); U.S.N.M.; Eureka, May 22, 1903 (H. S. Barber); U.S.N.M.; Humboldt Co. (William Hoquiam); U.S.N.M.

In the United States National Museum there is a specimen labelled "Burke, Col." upon which record is based the published account of the occurrence of the fly east of the Great Basin. I can find no "Burke" in any Atlas of Colorado and it is preferable to omit this record until it is further confirmed.

Bittacomorpha clavipes (Fabricius)

This species has an unusually wide range in eastern and central North America. It is of interest to record the most westerly records so far discovered.

Wyoming: Moran, near Pilgrim Creek, Grand Teton National Forest, altitude 6,800 ft., July 5, 1942 (C. P. Alexander).

Colorado: Manitou Park, July–August (F. H. Snow); University of Kansas; Monarch Pass, altitude 10,500 ft., July 1, 1934 (C. P. Alexander); Pingree Park, August 13, 1934 (C. W. Sabrosky).

Utah: Garden City, August 25, 1938 (Knowlton & Hardy).

Bittacomorpha occidentalis Aldrich

Apparently restricted to the Vancouveran Region and nowhere over-lapping the known range of the preceding species.

Washington: Mount Rainier, July 8, 1940 (H. & M. Townes); Ashford, August 18, 1940 (H. & M. Townes).

Oregon: Hood River, June 3, 1917 (F. R. Cole); Cascadia, June 30, 1939, August 12, 1924 (H. A. Scullen); Linn Co., August 14, 1929 (J. E. Davis).

California: Fieldbrook, May 18, 1903 (H. S. Barber); Eureka, May 22, 1903 (H. S. Barber).

It appears that the range of this fly is almost identical with that of *Bittacomorphella sackeni* (Röder).

NOTES ON APODEMIA (F. & F.) AND OTHER SOUTHERN BUTTERFLIES OCCURRING IN NORTHERN CALIFORNIA.

By Robert Grant Wind, Berkeley, Calif.

During the past twelve years, I have noticed with interest that captures of Southern butterflies in Northern California have occurred with increasing regularity. Several species seem to have established themselves and now breed locally. Most of these species are as yet found only in isolated colonies.

Typical *Apodemia mormo* (F. & F.) have been taken near Pacific Grove (M. Deudoroff) Pine Crest, Strawberry Lake in the Sierras (R. G. Wind) and Mount Diablo, Contra Costa County (R. G. Wind) Mr. Harry Lange also reports an *Apodemia* from Lake County which I have not yet seen.

Aside from typical *mormo,* we have an interesting sub-species from the sand dunes of Antioch which has been named *Apodemia mormo langei* (Comstock). It seems rather strange that a subspecies such as *langei* could exist only 20 miles from typical *mormo* without intermingling. I have a long series of *langei* from Antioch and find them very constant.

From Mitchel's Canyon on Mount Diablo, I have a good series of *mormo,* typical in every respect. These, too, are constant in markings and nothing which could be mistaken for a *langei* has been found on Mount Diablo.

During the Fall of 1940, from August until December, *Phoebis sennae lubule* (L.) fairly swarmed in the streets of Berkeley. Reports of its presence were also received from Oakland, San Francisco, Marin County, and Santa Clara County. No doubt it reached even further north. All specimens captured were in fresh condition, indicating local breeding. Students at San Jose State College found and reared larvae at San Jose which proved beyond a doubt that *lubule* has established itself in the San Francisco Bay region.

Isolated captures of *Atlides halesus* (Cram) have been reported from Northern California in the past and the species is known to stray as far north as Oregon at least. In September, 1940, Mr. John MacSwain, while collecting Hymenoptera near Livermore, found a large colony of *halesus* busily feeding at flowers. In a short time, Mr. MacSwain captured 20 or 30 specimens which he brought to me for determination. The abundance of the species seems to indicate its establishment in the Bay Region.

Brephidium exilis (Bdv.) is well established at Antioch, and a few specimens have even been caught on the streets of Oakland.

Finally we have the colony of *Philates sonorensis* (F. & F.) at Alum Rock Park, Santa Clara County. This colony has now grown so large that *sonorensis* can be said to be common.

How many other Southern California residents will move North remains to be seen. The author would appreciate any records from collectors in Northern California on this subject.

A Spurious North American *Eumenes* (Vespidae, Hymenoptera).—In a study of the *Eumenes* of eastern North America, in this Bulletin (1938, XXXIII, p. 63), I discussed the possibility of *Eumenes macrops* de Saussure (1852) being identical with *E. globulosus* de Saussure (1856), but reached no definite conclusion. A few months later, Mr. A. Giordani Soika, of Venice, Italy, examined the type of *E. macrops* at the British Museum and recognized it as a common Oriental species. Of this he informed me in a letter dated April 30, 1939. He had planned to publish his findings in a paper on Oriental *Eumenes,* but I am not aware that this has been published. For American students it will suffice to know that *E. macrops* should be deleted from the North American lists and that it cannot claim priority over or replace the name *E. globulosus.*—J. BEQUAERT, Museum of Comparative Zoölogy, Cambridge, Mass.

IMMATURE STAGES OF BAJULATA BAJULA GODING (MEMBRACIDAE, HEMOPTERA).

By W. D. Funkhouser, University of Kentucky, Lexington, Ky.

The genus *Bajulata* was erected by Ball in 1933 to accommodate a single species, *bajula* Goding. This species has had a rather varied taxonomic career. It was described by Goding in 1894 in the genus *Evashmeadea;* was transferred by Van Duzee in 1908 to the genus *Vanduzea;* then finally made the type of the genus *Bajulata* by Ball. The genus has remained monotypic.

Bajulata bajula was originally described from Arizona and is one of the commonest, best known and most widely distributed of the Membracidae in the south-west. However, nothing has ever been reported regarding its life history or its host plants.

In the spring of 1942 the writer was able to collect large numbers of these insects in the vicinity of Tucson, Arizona, and during the month of April found the nymphs of all five instars.

The best collecting ground for this species was the Saguaro National Monument about 17 miles east of Tucson. This area is a great cactus forest of over 63,000 acres which covers an undulating portion of the desert and contains probably the greatest stand of saguaro in the world. A number of small ravines support a considerable growth of palo verde, creosote, mesquite, mimosa and other shrubs in addition to the various cacti. The host plant for *B. bajula* was mesquite (*Prosopis juliflora*) and on this plant were found the egg-slits, all of the nymphal instars and the adults.

The egg-slits were in the young green stems, were lenticular in shape, averaging 7 millimeters in length and 1.5 millimeters in maximum width and were arranged spirally around the twig much in the fashion of the genus *Ceresa.*

The fact that all of the nymphal instars were to be found at the same time indicates that this membracid, like many other species of the family, has a long period of oviposition so that the eggs hatch and the immature stages appear over a considerable period of time. The nymphs were attended by two species of small black ants. Dr. M. R. Smith has determined one of these ants as *Solenopsis xyleni* and the other as *Crematogaster* sp. of the *opaca* Mayr group.

The technical descriptions of the immature stages are as follows:

First Instar

Measurements: Length 2.8 mm.; maximum width 0.8 mm.

White, with broad head and brownish lateral band; dorsal surface bearing spines.

Head reddish-brown, broad, flat, roughly sculptured; dorsal margin serrate; eyes prominent, deep red; ocelli small, reddish; antennae colorless, well developed; clypeus reddish, beak long.

Prothorax white, well formed, dorsal margin serrate with six small teeth; mesothorax white, faint lateral patch of brownish; dorsal margin with five small teeth; mesothorax white with lateral area tinged with brown, dorsal margin with four small teeth.

Abdomen with seven visible segments; all segments white with faint lateral band of brown; the first six segments each bearing a single dorsal spine; seventh segment long, tubular, weakly serrate above, ending in the anal tube.

Undersurface white; legs white and much flattened; tibiae weakly spined.

Second Instar

Measurements: Length 3.3 mm.; maximum width 1.4 mm.

Pale greenish-white with eyes and legs brownish; dorsal margin of thorax weakly and irregularly serrate; dorsal margin of abdomen spined.

Head pale green, flat, dorsal margin strongly convex, inferior margin straight; eyes reddish-brown; antennae brownish, well developed; ocelli small, colorless; clypeus small, flat, not projecting below inferior margins of genae.

Prothorax heavy, greenish, dorsal margin strongly convex and irregularly serrate; mesothorax greenish, dorsal margin weakly serrate; wing pads beginning to appear; metathorax greenish, dorsal margin convex, wing pads faintly indicated.

Abdomen greenish without markings; seven segments well developed; first six segments bearing dorsal spines; last segment tubular and protruded.

Undersurface greenish-brown; legs brown and much flattened; tibiae weakly spined.

Third Instar

Measurements: Length 5 mm.; maximum width 2 mm.

Greenish-brown; robust; dorsal spines reduced; pronotum well developed and beginning to overlap the dorsal margin of the mesonotum.

Head mottled brown and white; twice as broad as high; dorsal margin weakly sinuate; inferior margin straight; eyes very large, brown; ocelli large, reddish-brown; antennae weak.

Prothorax brown. Pronotum strongly developed, dorsal margin convex and extending backward over part of mesonotum, inferior margin sharply pointed; mesothorax broad, wing pads well developed; metathorax broad, dorsal margin smooth, wing pads very distinct.

Abdomen dark grayish-brown; dorsal spines reduced; first six segments uniform in structure; seventh segment produced and extended to form the anal tube.

Undersurface grayish-brown; legs only slightly flattened; femora gray-green; tibiae brown and edged with spines.

Fourth Instar

Measurements: Length 6.5 mm.; maximum width 2.8 mm.

Brown, speckled with white; pronotum covering half of mesonotum; anal tube distinctly upraised; wing pads large and set off from thoracic segments.

Head quadrangular, twice as broad as high, brown with white fascia; eyes very large, reddish-brown with white borders; antennae short, black; ocelli small, inconspicuous, amber-colored.

Prothorax brown and strongly developed; pronotum covering half of dorsal surface of mesonotum; mesothorax wide with front wing pads large, distinct and black; metathorax wide with wing pads well developed.

Abdominal segments weakly produced above, smooth below; anal tube very large and strongly turned upward; uniformly brown, speckled with white.

Undersurface light brown; legs grayish-brown, not flattened; tibiae pilose; tarsi well developed.

Fifth Instar

Measurements: Length 7 mm.; maximum width 3 mm.

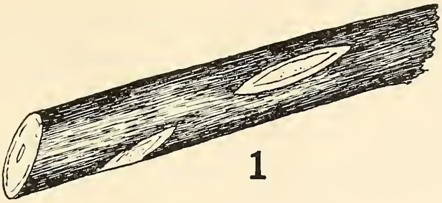
Dark brown with white spots; pronotum covering most of mesonotum; wing pads very large; seven abdominal segments distinct; anal tube long and straight.

Head quadrangular, twice as broad as long, brown with horizontal white bands; base arcuate; lower margin straight; eyes very large, brown; ocelli small, white; antennae minute; clypeus very small, triangular.

Prothorax brown with white spots; pronotum convex, covering most of mesonotum; metanotum broad; wing pads on both mesothorax and metathorax well developed.

Abdomen brown mottled with white, showing seven abdominal segments in addition to the long, straight, somewhat flattened anal tube; no dorsal spines; anal tube pilose.

Undersurface brown; legs light brown; tibiae flattened and pilose; tarsi gray-brown with claws well developed.



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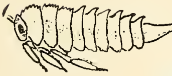

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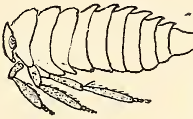

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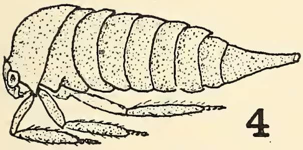

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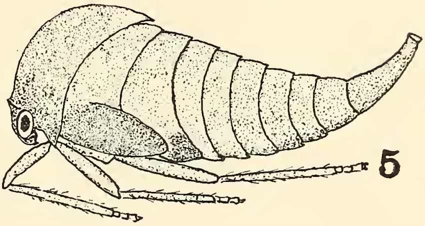

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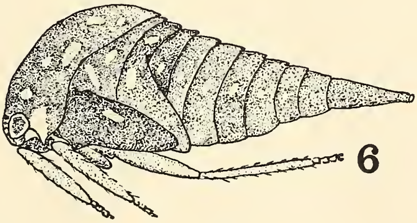

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Explanation of Figures.

Fig. 1. Egg-slits.
Fig. 2. First instar.
Fig. 3. Second instar.
Fig. 4. Third instar.
Fig. 5. Fourth instar.
Fig. 6. Fifth instar.

NEW SPECIES OF AMERICAN SYRPHID FLIES.

By F. M. Hull, University of Mississippi.

Several new species of Syrphid flies have accumulated in the collection of the author and are here described. Types unless otherwise stated are in the author's collection.

Metasyrphus nigrocomus n. sp.

Characterized by the curved third vein and the fasciate spots of the abdomen which reach the lateral margins of the second segment. Related to *aberantis* Curran.

Female. Length 11 mm. *Head:* Face and cheeks yellow, the former with a brownish-black stripe reaching narrowly above almost to the antennae. The front is shining black except on either side just above the antennal base. Pollinose areas of front obscured by grease. The frontal and upper facial pile is long and black; lower facial, postocelli and occipital pile yellow. The antennae are blackish, the third joint obscurely reddish below; the arista is brown and strongly thickened upon the basal three-fifths, the sharply narrowed remainder blackish. *Thorax:* shining greenish-black with faint shining brown vittae and thick, long, erect yellow pile; pleural and postcalli pile yellow. The yellow translucent scutellum has yellow pile narrowly at the base, and numerous very long fine hairs over the disk and margin; there are a few yellow hairs extremely low upon the margin. Squamae whitish-yellow. *Abdomen:* broadly black; second segment black with a large yellow spot on either side, moderately separated and with truncate medial edge; its posterior border is convex and the spot is slightly diagonal and reaches the lateral margin in full width. Third segment with a slender, curved, medially wider, narrowly separated, subbasal pair of fasciate spots; the anterior corners are narrowly yellow also. Fourth segment with a pair of tiny yellow, subbasal diagonal spots in the middle and the anterior corners yellow. Whole posterior margins of fourth and fifth segments, widely in the middle, brownish-yellow; basolateral margin of fifth segment yellow on either side. Pile of abdomen long, erect and black on the posterior third of the second to fourth segments and shorter near the edge; elsewhere yellow. *Legs:* the fore and mid tibia, base and apex of hind tibia and middle three segments of all the tarsi yellowish. Remaining tarsal joints brown. Femora yellow with the basal third or less of the first four and the basal three fifths of the last pair blackish; pile of the black areas chiefly and of the dorsal aspect of the hind tibia blackish. *Wings:* pale brown tinged throughout, the stigmal cell dark brown; third longitudinal vein with distinct curve.

Holotype: female. Mt. Rainier, Washington, July 10, 1926 (F. M. Hull coll.). This species is apparently closely related to *aberantis* Curran; as it is from the same type locality, I have held it for some years undescribed. It differs in a number of points, however. The broken spots of the third and fourth abdominal segments, and the fact that the lateral corners are yellow, the band of the second segment reaching the sides, the wholly black front, the light yellow cheeks, etc.

Xylota artemita n. sp.

Related to *bigelowi* Curran. The fore and midtibiae are wholly pale, or barely stained. There are only a very few black hairs above the base of the wing. Mesonotal pile flat, short and brassy. Abdomen largely opaque.

Female. Length 8 mm. *Head:* front and vertex shining black, the latter with white pile, the former with a central, transverse fascia with white pubescence, white pilose, which is linearly connected with the white pubescence covering the whole of the black face. The first two joints of the antennae are black, the third joint is brownish-black, the ventral half and base diagonally reddish. Artista black, the apex narrowly whitish. *Thorax:* black with a rather strong brassy cast and very short, entirely flattened golden pile. The scutellum is concolorous and similarly pilose, with a pair of rather long apical bristles and two pairs of shorter lateral ones. The pleural pile is wholly whitish, upper wing base pile reddish-golden with two rows of short black bristles; pile of post calli wholly golden. *Abdomen:* first segment shining black, second segment feebly shining bluish-black with on either side a moderately large, subquadrate, light brown spot. The lateral and posterior margins of this spot are almost rectangular; the medial and anterior margins are linearly excavated; they are widely separated from the lateral margin of the segment. Third segment with smaller, more transverse spots. Fourth segment shining black except narrowly along the base. Pile of the second segment flat and golden in the middle, black posteriorly with some golden pile intermixed and erect and white along the sides.

Pile of third segment erect and white only narrowly along the anterior corners, black apically, but with extensive white triangles baso-laterally. Pile of fourth segment entirely appressed, black apically with prominent baso-lateral white triangles. *Legs:* hind femora slender with numerous, short black spines ventrally upon the hind pair, occupying the outer two-thirds. Pile chiefly white, blackish apically. The whole of the front and middle tibiae are whitish; in their central portion they may appear in oblique light pale brown but this is scarcely discernible. The basal third of the hind tibiae is white, the remainder dark brown. The first two joints of all of the tarsi are yellowish-white. *Wings:* pale brown, the stigmal cell darker.

Holotype: female. May 20, 1942, Oxford, Mississippi, F. M. Hull, collector. Paratypes: two females, same data.

Xylota astarte n. sp.

Related to *aristata* Johnson. The arista is white on the apical half, yellow on the basal fourth, black between; the whole mesonotal and pleural pile is pale, except narrowly over the wing base; the middle tibiae almost entirely and the front tibiae are largely pale. The hind femora has two or three widely spaced, long, spinous bristles upon either side near the apex.

Female. Length 6 mm. *Head:* the front, vertex and face are shining black, the former with a central, transverse fascia of white pubescence and white pile. The ocellar and pre-ocellar pile is black; post-ocellar pile yellow. The face is short and covered with yellowish-white pubescence, discontinuous with the pubescence of the front. Antennae light reddish-brown, the basal half of the third joint paler; the apical three-fifth of the arista is white, the basal half of the remainder yellow, the remaining section black. *Thorax:* bluish-black with slight coppery reflections, the pile is short, erect, white or pale yellow, with a narrow row of black bristles above the wing base. The scutellum is concolorous, its pile and several pairs of marginal bristles white. Squamae white with white fringe. *Abdomen:* shining bluish-black; the second segment has a pair of moderate-sized, obscure reddish-brown spots separated from all margins. Spots of third segment wholly shining and opaque and erect white pilose; remainder of that segment appressed black pilose. Basal corners of fourth segment erect white pilose, followed by a diagonal band of appressed white pile, leaving a large posterior triangle of appressed black pile, in the central apex of which there are numerous white hairs. First segment white pilose except over the black, basal medial and posterior portions; obliquely viewed the posterior black fascia is reddish-sepia pollinose. *Legs:* the femora are black, the base of all pairs yellowish-brown, the apex of the first two more widely and the extreme ventral portion of the apex of the hind pair brownish. Hind femora moderately thickened, especially in the middle, with three, long, sharp, lateral, widely spaced ventral spines on the outer side and two on the inner. Middle tibiae whitish-yellow, faintly brown near the middle. Anterior tibiae pale, a little darker upon the middle third. Hind tibiae pale on the basal fifth, diffusely merging with the dark brown remainder. First three anterior and middle tarsal joints whitish; first three hind tarsal joints pale brown, paler ventrally. *Wings:* pale brown; stigmal cell darker.

Holotype: female. May 20, 1942, Oxford, Mississippi, F. M. Hull, collector.

Lejops orion n. sp.

Related to *relictus* Curran and Fluke. Distinguished by the almost wholly light orange, golden pollinose markings of the abdomen of the male and the extensively light yellowish scutellum.

Male. Length 10 mm. *Head:* the face and front are golden pubescent, the former golden pilose, the latter with chiefly black hair on the lower part and entirely black pilose above. The cheeks are dark brown. The antennae are wholly pale orange including the arista. *Thorax:* mesonotum densely yellowish pollinose, the pollen almost with a golden cast and with three, wide, black, opaque vittae. The scuttellum is shining brownish-black only upon the basal third; the remainder is entirely light, subtranslucent, ochraceous. The pile of the mesonotum and scutellum and pleura is entirely light golden; longer on the scutellum. *Abdomen:* of typical narrow subcylindrical shape, the first segment is greyish-yellow pollinose, the anterior corners, however, yellow. Second segment with a basal black triangle reaching only to the point where the first segment turns forward. The medial portion of the black triangle is indented by a faint brown medial vittae which is expanded some distance before the apex of the segment into a transverse fascia fading into the pale orange of the segment towards the sides. Anterior half of the lateral margin pale yellow and pale yellow pollinose and extending diagonally towards the mid line. Third segment entirely pale orange with a short, oblique, elongate, small yellowish pollinose spot in the anterior corners. Fourth segment similarly colored with the anterior corners and the lateral and posterior margins yellow pollinose. The central, submedial, yellow pollinose spots are more slender and more widely separated than in *relictus*. *Legs:* the whole of the anterior tibiae and tarsi, the narrow base of their femora and their apical third or more and the basal sixth of the hind femora, are pale yellow. The remainder of the hind femora are yellowish-brown with a black saddle-like spot over the middle but not covering the ventral surface. More than the apical third of the hind femora is brownish-yellow. The hind tibiae are brown apically and subbasally; the hind trochanters have a spur which is of about the same proportions as in *relictus*. *Wings:* pale brown; stigma quadrate.

Female. The pollen of the face is pale brownish-yellow; the front had an obscure, central black fascia across the middle. Thorax and scutellum similar to the male. *Abdomen:* shining brownish-black upon the basal margins, widely and more black upon the second segment; moderately wide upon the third segment and very narrowly upon the fourth segment; the apices of the second and third segments are widely black; there is a bicrescentic fascia across the middle of the second to fourth segment. The black of all of these fascia is produced forward in the middle to touch the anterior border. This leaves three pairs of yellowish pollinose crescentic elongate spots in the centers of these segments, the pair upon the second segment wider or deeper and produced anteriorly forward to cover all of the anterior half of the lateral margin. *Legs:* similar to the male.

Type material: 18 cotypes, 10 males and 8 females all collected at Oxford, Mississippi, July, 1935, in a spring-fed swamp, by F. M. Hull.

Baccha dracula n. sp.

Related to *panamensis* Curran, the front is not transversely excavated; the middle of hind tarsi are yellow; abdomen partly subopaque centrally.

Male. Length 7 mm. *Head:* the front bright steel-blue with blackish pile; the middle is narrowly black and is yellowish in front of the antennae, the yellow area with a central brown spot. The face is steel-blue and obscurely yellow along the eye margins when viewed obliquely; its pile is white; almost the entire face except the tip of the tubercle is silver pubescent. The antennae are dark brown, the third joint black except narrowly upon the base. The arista is slender, no longer than the antennae. *Thorax:* mesonotum moderately shining, brownish-black with a pair of white, obscure, brownish vittae upon the anterior portion when properly viewed. The mesonotal pile and anterior collar and that of scutellum is light brown becoming blackish on the sides of the mesonotum and dark brown or black upon the scutellum. Squamae white with white fringe. Pleura black with a bluish cast. *Abdomen:* spatulate, the base of second segment about three-fifths as wide as apex of third, the second segment of practically the same length as third and the fourth very nearly as long as third. The abdomen is dark shining brownish-black, subopaque upon the sides of the second segment and of the third and fourth segment. The anterior corners of the third and fourth segments are barely lighter brown, the color diffuse and obscure and this area covered with whitish pile, the remainders of the segment except for the white pile on the sides of the second segment black pilose. The black pile is appressed. *Legs:* slender, dark brown, the extreme apex of the femora, narrow base of the tibiae brownish-yellow. The hind metatarsi are dark brown, the second and third joints yellowish, the last two and the remaining tarsi light brown; the brown of the anterior legs is lighter than that of the posterior pair. Pile of legs black. *Wings:* quite pale brown, tinged with darker brown upon the anterior basal half. Stigmal cell of about the same shade. Anal crease long, nearly straight and well defined, reaching the margin.

Holotype: male. Puerto Castilla, Honduras, April 4, 1926, R. H. Painter, collector.

Notice to our Readers—As you have seen, this is a small number. This is because we have used already set up matter in order to catch up with our issue schedule. It will be made up in the numbers to follow.—Editor.

SOME HOST RECORDS FROM THE PARASITOLOGICAL COLLECTION OF THE STATE UNIVERSITY OF IOWA.

By Hugh L. Keegan, Iowa City, Ia.*

The following are host records found in a study of the parasitological collection of the State University of Iowa. Except when otherwise indicated, the specimens were collected by Dr. L. O. Nolf of the Department of Zoology, under whose direction this study was carried out.

CLASS INSECTA

Order Anoplura

Family Haematopinidae

1. *Hoplopleura arboricola* Kellog and Ferris: 4 females and 2 males from a Fox Squirrel, *Sciurus niger rufiventer,* at Iowa City, new host record (H.L.K.).
2. *Enderleinellus suturalis* (Osborn): 6 females and 4 males of a Woodchuck, *Marmota monax,* from Minnesota, new host record.
3. *Neohaematopinus antennatus* (Osborn): 11 females and 7 males from a Gray Squirrel, *Sciurus carolinensis hypopheus,* at Iowa City, new host record (H.L.K.).
4. *Euhaematopinus abnormis* Osborn: 5 female specimens from a "mole" at Iowa City. This has been recorded on only one other occasion, from the mole, *Scalops aquaticus,* at Ames, Iowa, by Osborn (1896).

CLASS PENTASTOMIDA

Order Porocephalida

Family Porocephalidae

1. *Porocephalus crotali* (Humboldt): 1 female specimen from a Cotton-Mouth Moccasin, *Agkistrodon piscivorus* (Lacépéde), from Louisiana, new host record.

CLASS ARACHNIDA

Order Acarina

Family Parasitidae

Genus *Spinturnix* von Heyden 1826

Spinturnix iowae n. sp.

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* Zoological Laboratory, State University of Iowa, Iowa City, Iowa.

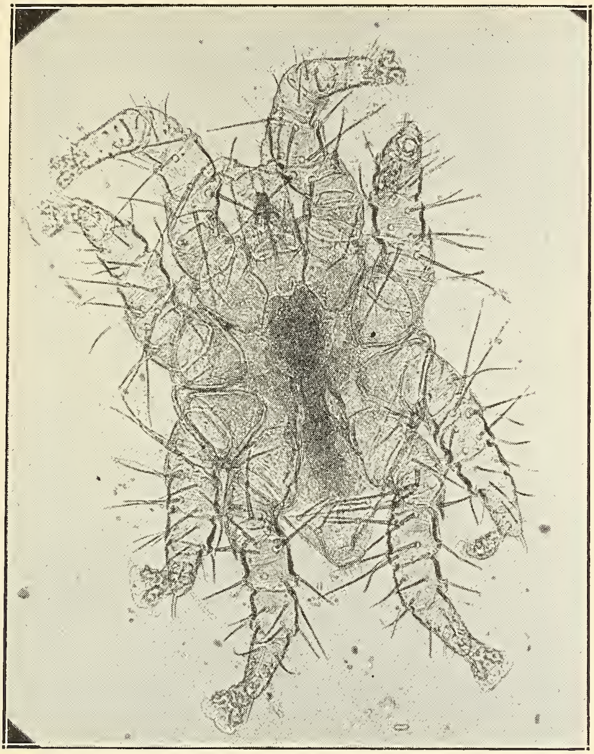

Fig. 1.—Ventral view of holotype.

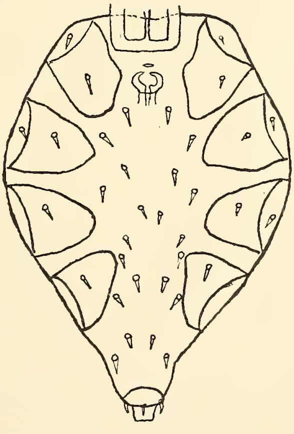

Fig. 2.—Pattern of spination on venter of holotype.

One male specimen of a Parasitid mite, which is referable to the genus *Spinturnix,* and which apparently represents a new species, was collected by Dr. L. O. Nolf, from a Little Brown Bat, *Myotis lucifugus* (Le Conte), at the Iowa Lakeside Laboratory at Milford, Iowa, in May, 1936. This is the first record of a member of this genus from North America.

This new form, for which I am proposing the name **Spinturnix iowae**, closely resembles *Spinturnix araguensis* Vitzthum 1931, from which it differs in the following respects:

a. Arrangement of spines on the venter.
b. The posterior margin of the dorsal shield is bluntly pointed, and extends to the level of the most posterior pair of spines on the dorsal surface of the abdomen.
c. The jugular plate is spindle-shaped, and is only half as wide as the armature of the genital pore.

It was impossible to trace the outline of the ventral plate in this specimen. However, 11 pairs of spines are present in the central region of the venter. The pattern of their arrangement is shown in figure 2. There are other small spines on the coxae.

Legs I and IV are longest, and leg II is shortest. All legs bear spines, which are longer on the dorsal surface. Some of the dorsally located spines are over 200 micra in length, while those on the ventral surface of the legs average about 45 micra in length. The longest spines are borne on the femur and patella of each leg. Figure 1 is a photomicrograph of the specimen.

Measurements: Length (without capitulum)—879 micra; width (between coxae II and III)—662 micra; length, leg I—770 micra, leg II—647 micra, leg III—739 micra, leg IV—802 micra.

Host: *Myotis lucifugus* (Le Conte).
Locality Collected: Milford, Iowa.
Type: 1 male holotype in U.S.N.M.

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Curious Food-habit of Carabus nemoralis.—One night, while searching with a flashlight for beetles in my yard, I noticed a specimen of *Carabus nemoralis* Müll crawling over a fallen pear. The beetle approached a large hole bitten out in the fruit, and then slowly began to tear away small pieces, and masticate them between its mandibles. This procedure lasted for about half an hour, until the hole became visibly enlarged. The habit apparently is not an anomalous one, since, during the month of September, I made several more observations. Sometimes, in a single night I observed several beetles feeding on pears, and not infrequently two or three specimens on a single fruit. How long the feast lasted, I don't know, but at any rate I have seen these insects clinging to the fruits for more than an hour.

Carabus nemoralis were not the only guests at the "table." Another common carabid, *Pterostichus validus* Dej. was present in great numbers, as well as various slugs and sow-bugs (*Porcellio*).—Borys Malkin, Eugene, Oregon.

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THE COMPARATIVE MORPHOLOGY AND TAXONOMY OF SOME LARVAL CRIOCERINAE (COLEOPTERA, CHRYSOMELIDAE).[1]

By Murl Beauford Sailsbury, University of Illinois, Urbana, Ill.[2]

Introduction.

The genera *Crioceris* Geoff. and *Lema* Fabr. are in the order Coleoptera, suborder Polyphaga, family Chrysomelidae, tribe Phytophaga, Group III, Eupoda, and subfamily 4, Criocerinae. The materials of any magnitude treating with larval Criocerinae are those of Böving and Craighead (1931) which includes illustrations of two species; Paterson (1931) treating one species, with a key to the subfamily; and Sanderson (1901) which deals with the classification of the Chrysomelidae in general.

In this study an attempt was made to contribute to the characterization of the larval Criocerinae begun by Paterson (1931, p. 938), to describe completely the larvae of the species available for study, to point out generic differences between the larvae, and to prepare a key for the separation of the known larvae of the two genera and also of the species available.

The rather common custom of naming the sclerites after the area on which they are borne rather than using the term as referring to the whole, usually indefinite, area to which it truly applies was followed. (Ex.: Episternum referring only to the heavily sclerotized part.) No proposed system for the naming and numbering of the sclerites and setae of larval Coleoptera was used. These systems are very unwieldy things and are not readily applicable to the arrangements of the sclerites and setae occurring on the species

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[1] Contribution No. 237 from the Entomological Laboratories of the University of Illinois.

[2] Now instructor in biology, Evanston Township High School, Evanston, Ill.

JUL 3 '43

studied. Instead of following any proposed system, the sclerites and setae have been arbitrarily numbered with consecutive Arabic numerals to facilitate locating them on the setal charts while using the descriptions.

Paterson, on the basis of her studies of *Lema cyanella* L. states (1931, p. 938) "The larvae resemble those of *Chrysomela* in their somewhat arched body, but differ from them in having no marked anal proleg (pygopod),[3] and also in that their spiracles are large and biforous. The anus is located at the posterior extremity of the abdomen and is rather more dorsal in position than in the majority of Chrysomelid larvae. They are further differentiated from the larvae of *Chrysomela* by the fact that the primary chaetotaxy is not obscured after the first ecdysis. The ventral surface of the abdomen is slightly tuberculated, each area appearing to function as a proleg (pseudopod)."[3] It is also stated on the same page that the anterior (ventral)[3] margin of the labrum is deeply incised, and differs from that of other Chrysomelid larvae in exhibiting a few sharp serrations on either side of the incision, and. . . . "Anteriorly the epipharynx has usually three pairs of long setae (on each lateral half?)."[3] For the Criocerinae the author agrees that the "anterior" margin of the labrum is deeply incised, but not that "it exhibits several sharp serrations on either side of the incision." Specimens studied have the prominent incision, but the margins on either side, if irregular, are sinuate. The epipharynx of *Lema sexpunctata* Oliv. contains sixteen large setae on each lateral half in contrast to only two for *L. trilineata* (Oliv.) and three for *C. asparagi* Linné, *C. duodecimpunctata* Linné, and *L. cyanella* Linné (Paterson, 1931).

Paterson states in her key to larval Chrysomelidae (1931, pp. 945–46) that the abdomen is straight. "Straight" for the Criocerinae is probably used in contrast to such an extremely curved abdomen as exemplified by *Leptinotarsa decemlineata* (Say). The abdomens of the Criocerinae are not straight, but have the caudal tip curved rather abruptly ventrad.

Acknowledgments.

The writer is indebted to Dr. Wm. P. Hayes for suggesting this study and is extremely grateful for his guidance and many timely suggestions and criticisms. The loans of specimens of *Lema trilineata* (Oliv.) and *Lema sexpunctata* Oliv. by Dr. C. F. W. Muesebeck of the National Museum, of *Crioceris duodecimpunctata*

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[3] Parentheses and content supplied by the author, here and after.

Linné by J. B. Schmitt of the Department of Entomology of the New Jersey Agricultural Experiment Station, and of *Crioceris asparagi* Linné by the Department of Entomology of the University of Illinois are acknowledged.

LARVAL DESCRIPTIONS.

Crioceris asparagi Linné.

(Described from mature larvae in vial marked "*Crioceris asparagi,* Asparagus beetle, Urbana, Illinois, May 9, 1930.")

Full grown larva.—About 5 mm. in length and 1.75 mm. in greatest width; legged, subcylindrical with the caudal end curved abruptly ventrad. Sides curved, narrowed cephalad from metathorax and caudal from sixth abdominal segment. Body segments, with the exception of prothorax and tenth abdominal segment, bearing lateral, rather prominent, regularly arranged tubercles with pigmentation less intense than that of adjoining cuticula. Segments separated by grooves, no intersegmental belts or areas being distinguishable.

Head capsule shining, dark brown in color. Pigmentation of the same intensity on all parts of head capsule except the genae, which are slightly lighter. Mandibles also dark brown. Postmentum (Fig. 13, Mt + Smt) nearly covered by a sclerite which is slightly more heavily pigmented centrally and along dorsal margin. A narrow more heavily pigmented band marks the dorsal margin of prementum. (Fig. 13, Prmt). Maxillary stipes bearing a large sclerite which is pigmented to about the same degree of brown as sclerite of the postmentum; pigmentation less intense on ventral and mesal margins. General ground color of body dirty yellow (in preserved specimens). All body sclerites, except median portion of prothoracic tergum which is readily distinguishable, of about the same color as the general body color; median portion darker but much lighter than the head capsule. Pygidium the same color as the body and hence not readily distinguishable. Thoracic episternal sclerites (Fig. 25, Eps) lighter brown than head capsule. Epimera (Fig. 25, Epm) only slightly darker than the body. Episterna of the same degree of brown as the leg segments. Claw and margins of sclerotized parts of leg segments dark brown. Pulvilli same color as body. Thoracic sternal plate (Fig. 25, Psc) divided, only slightly darker than body. Spiracles darker than, but remaining thoracic, and abdominal sclerites the same color as the body; body setae dirty white.

Head hypognathus, practically circular in outline, but slightly broader than long; joined to prothorax by a distinct cervix. Prothorax only slightly wider than head. Capsule with distinct epicranial stem (Fig. 1, Eps). Vertex (Vt.) produced slightly dorsad immediately on either side of stem. Epicranial arms (Epa) distinct in their dorsal parts, but in well preserved specimens, very difficult to locate in region from ocelli to their ventral extremity caudad of antennae. A distinct outward bend in arms preceding the region of ocelli. Front (Ft) undivided and having four well developed setae on each side, two on an imaginary curved line connecting ventral margins of antennal rings, the lateral one dorsad of lateral margin of clypeus, the mesal one about one-half as far from a midcephalic line as the lateral one is from the antennal ring; remaining two on an imaginary line connecting ventral margin of antennal ring and point of union of epicranial arms. The third setae on an imaginary line connecting the two most dorsal ocelli on either side; the fourth setae about midway between the antennal ring and the point of union of the epicranial arms. Each lateral area of the vertex bearing six well-developed setae; one about midway between ventral tip of the epicranial stem and the dorsal part of head; a second about half way to the ocelli from the epicranial stem and only slightly dorsad from the epicranial arm; a third between the most mesal ocellus and the epicranial arm; a fourth and fifth immediately on each side of the most dorsal ocellus; a sixth dorsad of the most dorsal ocellus and on a line midway between the first and second setae, near the lateral margin of the head capsule. One seta on the caudal half of the vertex caudad of the group of four ocelli and slightly dorsad of a midline through them. Gena bearing two setae. Clypeus (Fig. 1, Clp) about four times as broad as long and bearing four well developed setae; ental surface bearing paired chitinous plates (Fig. 19, Cp). Labrum (Fig. 1, Lb) narrower than clypeus and about four times as broad as long. Distal portion of labrum curved caudoventrad with mesal portion deeply incised; margins of incision sinuate. Labrum on ectal surface bearing six well developed setae. Fronto-clypeal and clypeo-labral sutures distinct. Ental aspect of labrum (Fig. 19) bearing six well developed setae and eight well developed sensoria (Sc.).

Six ocelli present; a mid-lateral group of four visible in the cephalic aspect of head, and a ventral group of two on the gena, not visible on the cephalic aspect. Ocelli lighter in color than head capsule.

Antenna[4] (Fig. 2) short, two segmented. The second segment bearing a chitinous ring with a long sharply pointed seta and one papilla (Pap). This structure probably representing a rudimentary third segment. Second segment also bearing several other papillae and one large cone shaped sensory appendix (Sap) shorter than the seta on the tip of the last segment.

Mandibles (Fig. 22) identical, palmate, inner surface concave with five distal teeth, of which the third, or median, is longest, the second much smaller than the fourth, the fourth almost as long as the third, and the fifth rudimentary, short, broad and stubby. Inner margins of third and fourth serrate; second with inner surface slightly grooved. Exterior face of mandible with two well-developed setae.

Maxilla with a simple more or less rounded cardo (Fig. 13, Cd), and elongate divided stipes (St), and a galea (Ga). Cardo bearing one seta, stipes with two setae near lateral margin. Galea with three setae on ectal surface and five on ental surface, none truly mesal in position; ventral tip of galea heavily sclerotized. Palpiger (Pgr) with a broad sclerotized base on which are one large sensory pore and two long setae near ventral margin of sclerite. Maxillary palpus (Mxp) consisting of three segments all provided with heavily sclerotized bases. Second segment slightly longer and narrower than first and bearing two prominent setae on the ventro-lateral margin. Third segment longer and narrower than second and bearing one seta on the mesal margin and numerous sensoria on the tip which is incompletely sclerotized. Ental surface of the palpiger (Fig. 13, Pgr) and membrane of first segment of maxillary palpus with numerous prominent spines.

Hypopharynx (Fig. 16) somewhat membranous, and with one prominent seta on each ventro-lateral margin. Three pairs of hypopharyngeal setae (Hys) present; also one pair of sensory pores, meso-dorsad from the most ventral hypopharyngeal seta. Superlinguae (Sl) are represented by a pair of raised transversely creased areas, dorso-laterad from hypopharyngeal setae. No setae evident on superlinguae. Hypopharyngeal sclerites (Hysc) prominent, curved laterad and much broader at distal end; dark brown.

Labium set off from maxillae by ventral sclerotized exten-

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[4] Parts interpreted following the works of Paterson, Nellie F., 1931.

sion of stipes. Postmentum (Fig. 13, Mt + Smt) practically covered by a sclerite irregular in shape and degree of pigmentation; dorsal margin deeply emarginate at mesal point. One pair of well developed setae laterad on the postmentum, more dorsad than ventrad. Dorsal margin of prementum (Prmt) marked by a double-arched sclerite which is not continuous from ectal to ental surface. One pair of large setae and numerous sensoria occurring on the ectal surface of this sclerite; on the ental surface one pair of setae mesad from inner margin of labial palpus. Labial palpus (Lbp) consisting of a single segment with large sclerotized base bearing one seta and one sensorium; tip incompletely sclerotized and provided with numerous cone-shaped sensoria. Ligula (Lg) membranous and indistinctly separated from prementum; its ventral surface broad and bearing no setae.

Spiracles (Fig. 3) nine pairs, biforous, prominent, somewhat elliptical in shape; larger on mesothorax than on first abdominal segment and larger on first abdominal segment than on following seven segments.

Prothorax (Figs. 3 and 25, Pro) about four times as wide as long. Tergal shield conforming to curvature of thorax, but slightly raised and smooth; dorso-caudal margin abruptly rounded, divided along meson by a distinct suture. Setae on shield arranged in an irregular cephalic row of seven, a caudal row of two in somewhat ventro-laterad position, and one at ventral tip of shield centrally placed. Prothoracic spiracular area inconspicuous. Sclerite of laterotergum[5] (tubercle) (Fig. 25, Trl) bearing two setae. Presternal sclerite (Fig. 25, Psc) narrow and extending latero-dorsad to midline of coxal cavity; joined mesally, and bearing one seta on each lateral half. Episternum (Eps) large, bearing one well developed seta. Epimeron (Epm) less well developed, bearing one seta. Coxa articulated laterally with a distinct sclerite (Fig. 10, Cxa) located between episternum and epimeron; this sclerite more heavily pigmented centrally. Eusternum and sternellum fused, bearing a conspicuous sclerite (Fig. 25, Estl) on each lateral half; each sclerite with three setae. Poststernellum not indicated.

Mesothorax slightly wider than prothorax, and metathorax slightly wider than mesothorax. Arrangement of meso- and metathoracic sclerites identical. These segments differ, however, in that the mesothorax bears a spiracle and that the

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[5] After Anderson, W. H., p. 164, 1938.

sclerites on the metathorax in some cases are larger, particularly on the sternum. The following description of sclerites and setae will apply to either segment: Tergum divided by a groove running latero-ventrad and terminating laterad near a lateral tubercle. Cephalad of this groove is the prescutum (Fig. 25). The prescutal sclerites (1) indefinite, not meeting mesad, and bearing several minute setae. Caudad of the groove is the scuto-scutellum. Its sclerites (2) indefinite and bearing several minute setae. Sclerite on tubercle (3) bearing three setae. Spiracular area bearing one sclerite besides the spiracle. This sclerite ventrad of spiracle with one seta. Laterotergite (Fig. 25, 5) large, bearing one seta. Presternal sclerite not indicated. Episternum (Eps) bearing no setae. Epimeron (Epm) with one seta. Sclerites of eusternum (6) and sternellum (7) distinct and separated. Eusternum bearing four setae located mesad on sclerite, sternellum with one seta. Poststernellum not distinguishable.

Legs (Fig. 10) each consisting of coxa (Cs), femur (Fe), tibio-tarsus (Tb-Tr), a claw (Cl) and a pulvillus (Pu); well developed; the imaginary lines connecting coxae diverging caudad. Legs of prothorax slightly smaller than meso-legs which are slightly smaller than meta-legs. Coxa of each leg articulated to sclerotized plate (Cxa) between episternum and epimeron. Lateral margins of legs more heavily pigmented. Claw with cephalic margin almost straight, but curved mesad. Caudal margin widening proximad. Claw projecting distad over pulvillus which fills its inner surface.

Abdominal segments, one through eight, divided into two transverse areas, the prescuto-scutum (Fig. 3, Prs) and the scutellum (Scl). Grooves separating these areas discernible and extending a short distance on either side of mid-dorsal line. Each area marked by a transverse row of slightly elevated areas only slightly more heavily sclerotized than adjacent cuticula. These areas same color as surrounding cuticula. Prescuto-scutum with paired dorsal sclerites (Fig. 25, 1), two paired latero-dorsal sclerites (3), a paired lateral sclerite (5), and a paired latero-ventral sclerite (7). The scutellum with paired dorsal sclerites (2), small paired latero-dorsal sclerites (4), and two paired ventro-lateral sclerites (6 and 8). All sclerites except lateral sclerites (5) and latero-ventral sclerites (6) bearing one seta, these with two. Setae on all sclerites extremely small. Latero-tergite (9) tuberculous, bearing two setae, one dorsal and one ventral. Pleural tubercle with one sclerite (10), bearing two setae. Eusternum with pseudopods (12) each bearing one pair of small setae and small paired meso-ventral sclerites (13) with three small setae each. Sternellum with paired sclerites (11) bearing one seta each. Setae on latero-tergite, pleuron, and sclerites on sternellum (9, 10, 11) much larger than elsewhere on sclerites of abdomen.

Eighth abdominal segment as long dorsally as other segments, but narrowing latero-ventrad and ending ventrad of the lateral tubercle. No sternum or pseudopod therefore present. Prescuto-scutum with a small, paired, dorsal sclerite bearing one small seta. Latero-ventral sclerite (as in Fig. 25, 6) paired, bearing two small setae. Scutellum with small, paired, dorsal, median sclerites bearing two setae each. Spiracle large. Laterotergite (tubercle) well developed, bearing three setae.

Ninth abdominal segment slightly more than half as long as eighth abdominal segment, narrowing ventrad and bearing a pseudopod. Caudal margin of dorsal surface bearing two setae, one on either side of the mid-dorsal line. Laterotergite (tubercle) developed. bearing one seta.

Tenth abdominal segment developed as a short, ventrally directed pygopod which bears several, extremely small setae (about four in number) on caudal surface. On each lateral aspect a small sclerite bearing two small setae. Anal opening on mid-caudal surface of segment.

Crioceris duodecimpunctata Linné

(Described from alcoholic larvae from Entomology Department of the New Jersey Agricultural Experiment Station. Bottle labeled "*Crioceris 12-punctata.* Host, Asparagus." No other data.)

Larger than, but very similar to, *C. asparagi,* the full grown larva measuring about 7.75 mm. in length and about 2.5 mm. in greatest width. Body with tubercles as in *C. asparagi;* less dirty-yellowish in color. Protergal shield considerably darker than other body sclerites.

Head dark brown, somewhat mottled and very similar to that of *C. asparagi.* Epicranial suture very distinct, being yellow in color; arms easily traced to ventral endings caudad of antennal rings. Genae much lighter in color than remainder of head capsule. Setae arrangement on head similar to that of

C. asparagi. Ventral margin of clypeus considerably lighter in color. Postmentum light in color. Setae on ental aspect of galea much larger and heavier than in *C. asparagi.*

Cervix indistinct.

Thorax with arrangement of sclerites and setae similar to that of *C. asparagi.* Ventral sclerites of thorax enlarged and rather heavily sclerotized.

Arrangement of sclerites and setae on body similar to *C. asparagi* with the above modifications.

Lema trilineata (Oliv.)

[Described from mature larvae in vial No. 66 from U. S. National Museum. Marked: "*Datura stramonium.* (Insectary garden): Aug. 19, 1920; Washington, D. C.; F. H. Chittenden, Coll."]

Full grown larva—about 10 mm. in length and 4.0 to 4.2 mm. in greatest width; legged, subcylindrical and the caudal end curved abruptly ventrad. Sides curved, narrowed cephalad from first abdominal segment and caudad from seventh abdominal segment. Body segments, except ninth and tenth abdominal segments, bearing regularly arranged sclerites with pigmentation slightly more intense than that of adjacent cuticula. Segments separated by grooves, and intersegmental belts or areas being distinguishable between some segments.

Head capsule shining, dark brown in color; pigmentation same intensity throughout. Mandibles dark brown. Postmentum (Fig. 14, Mt + Smt) nearly covered by a sclerite which is slightly darker than adjacent cuticula. A narrow band, which is more heavily pigmented dorsally and medially, marks the dorsal margin of prementum (Fig. 14, Prmt). Maxillary stipes bearing a large divided sclerite which is more heavily pigmented on dorsal and mesal margins; pigmentation more intense than in postmentum. General ground color pale yellow (in preserved specimens). All body sclerites except median portion of prothoracic tergum, which is readily distinguishable and heavily pigmented, only slightly darker than general body color. Pygidium same color as body and hence not readily distinguishable. Thoracic episternal sclerites (Fig. 26, Eps) about same degree of brown as prothoracic tergal shield. Epimera (Epm) lighter in color than episterna. Episterna slightly lighter in color than sclerotized parts of leg segments, these being dark, shining brown. Pulvilli gray. Thoracic sternal plates (Fig. 26, Psc and Estl) divided; about same color as epimera. Spiracles much darker than body;

remaining body sclerites slightly darker than body; body setae whitish.

Head hypognathus; cephalic aspect practically circular in outline, but slightly broader than long; joined to prothorax by a distinct cervix. Cervix bearing paired, cephalo-ventral sclerites immediately behind head, paired latero-ventral, and paired mid-ventral sclerites. Lines connecting these sclerites on each lateral half forming an isosceles triangle with bases of triangle connecting caudal sclerites and only slightly longer than other sides; vertex at cephalic sclerite. Prothorax at widest part one and one-half times as wide as head. Head capsule with distinct epicranial suture (Fig. 4, Eps + Epa). Vertex produced slightly dorsad on either side of stem. Epicranial arms (Epa) distinct throughout entire length and curving ventrad near region of ocelli to their ventral ending caudad of antennae. Front (Ft) undivided and having four well-developed setae on either side; three in an almost straight line midway between mid-cephalic line and antennal ring; middle one slightly more laterad than other two. This imaginary line extending in a meso-dorsal direction. Fourth seta slightly dorso-mesad of antennal ring. Each cephalo-lateral half of vertex bearing eight well developed setae: one on dorsal peak of vertex, a second laterad of epicranial stem and dorsal of epicranial arm and about one-third the distance from epicranial arm to lateral margin of cephalic aspect of head, the third near epicranial arm slightly meso-dorsad of most mesal ocellus, the fourth between the two caudal ocelli in the mid-lateral group of four ocelli, a fifth as far dorsad of dorsal ocellus as distance between two consecutive ocelli in mid-lateral group, a sixth immediately ventrad of ventral ocellus in mid-lateral group, and the seventh and eighth in an imaginary dorso-latero-ventral line beginning at vertex and ending at ventral tip of gena, the seventh at one-third, the eighth at two-thirds the distance from vertex to gena. Gena bearing two setae.

Clypeus (Fig. 4, Clp) about four times as broad as long and bearing four, well-developed setae. Fronto-clypeal (Fcs) suture not present except for about half of each lateral half, but front separated from clypeus by a faint ridge when suture is lacking. A sensory pore is present in some specimens between the two lateral setae. Ventral margin of clypeus lighter in color. Labrum (Lb) separated from clypeus by a distinct clypeo-labral suture; about four times as wide as long, and bearing six setae on ectal surface. Ental aspect of labrum (Fig.

20) bearing a pair of large setae near each lateral margin. Labrum with a deep mid-ventral incision and on each side of incision two pairs of sensory cones (Sc) ; the mesal pair larger. One pair of sensoria (So) present in each lateral half near cephalic margin, several folds dorsad of incision. These sensory cones and folds representing the epipharynx.

Six ocelli present: a mid-lateral group of four visible in cephalic aspect of head, and a ventral group of two on gena not visible on cephalic aspect of head. Ocelli same color as head capsule, but evident because of raised hemispherical shape.

Antennae[6] (Fig. 5) short, two-segmented. The second segment bearing two separate setae, one borne on a distinct plate and spike-like, the other small and thread-like. Dorsad of thread-like seta three somewhat cone-shaped papillae (Pap). Ventro-laterad of spike-like seta one sensory pore (Po).

Mandibles (Fig. 23) identical, palmate, inner surface concave with six distal teeth. The fourth largest and longest, the first, second, and third much smaller than fourth, fifth and sixth. The first and second occurring along the outer margin; first, second, and third pointed, the sixth rudimentary and blunt. Inner margin of third serrate; both margins of fourth, fifth, and sixth serrate. Exterior surface of mandibles with two, well-developed setae, the most distal one larger.

Maxilla with a simple, somewhat rounded cardo (Fig. 14, Cd), an elongate stipes (St), and a galea (Ga). Cardo bearing one seta of moderate size, stipes with two setae near lateral margin, galea with five setae on ectal surface and five on ental surface. Palpiger (Pgr) with a broad, sclerotized base on which are one fairly large seta on dorsal margin, two near ventro-mesal margin, and one sensory pore slightly laterodorsad from the lateral seta. Maxillary palpus (Mxp) consisting of three segments all provided with heavily sclerotized bases. Second segment longer than first, but not as broad; third segment slightly longer than second, but much narrower, the first segment having one sensory pore on ectal surface; second with five small setae and a sensory pore on both ectal and ental surfaces; and the third with two small setae, two sensory pores on ectal surface and one on ental, and numerous small sensory cones in a cluster on tip which is incompletely sclerotized.

Hypopharynx (Fig. 17) somewhat membranous. Two pairs of hypopharyngeal setae (Hys); the ventral pair being replaced by a pair of sensory pores (Hyp). Superlinguae (Sl) are represented by a pair of raised, creased areas, dorso-laterad from hypopharyngeal setae. No setae evident on superlinguae. Hypopharyngeal sclerites (Hscl) prominent, curved laterad and flared at distal end; outer margin a smooth curve; inner irregular.

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[6] Parts interpreted following the work of Paterson (1931).

Labium (Fig. 14, Lb) set off from maxillae by ventral sclerotized extension of stipes. Postmentum (Mt + Smt) practically covered by a sclerite irregular in shape and degree of pigmentation; dorsal margin deeply emarginate at mesal point. Two pairs of well-developed setae placed laterad on postmentum, ventral pair more mesal in position. Dorsal margin of prementum (Prmt) doubly arched on both ectal and ental surfaces; sclerite continuous from ectal to ental surface. One pair of setae and sensory pores on ectal surface and on ental surface; one pair somewhat ventral in position. These setae mesad from each labial palpus respectively; the ectal pair more dorsal. Each sensory pore on ectal surface dorsad of palpus and laterad of seta. Labial palpus (Lbp) consisting of a single segment with a large sclerotized base. On ectal surface one seta and one sensory pore; inner surface with one seta and a pair of sensory pores; tip incompletely sclerotized and provided with numerous cone-shaped sensoria. Ligula (Lg) indistinctly separated from prementum; ventral surface broad and provided with one pair of setae and one pair of sensory pores.

Spiracles, nine pairs, biforous and prominent; peritreme prominent. Mesothoracic spiracle slightly larger than first abdominal spiracle, the latter larger than subsequent abdominal spiracles. Spiracles darker than general ground color of body.

Prothorax about four times as wide as long; tergal shield (Fig. 26, Tgs) conforming to curvature of thorax, slightly raised, surface irregular. Caudo-mesal margin irregular; each lateral half contiguous mesally. Setae arranged in a rather regular cephalic row of six, a caudal row of three, the two of which are more contiguous, and a single mid-ventral one. Prothoracic spiracular area inconspicuous. Sclerite of laterotergum (Lt) bearing two large and one small setae. A single secondary seta on a small cephalic laterotergal sclerite (Sl) immediately cephalad of laterotergite. Presternum with paired, raised sclerites (Psc) bearing one seta each. Episternum (Eps) and epimeron (Epm) bearing one seta each. Sclerite articulating with coxa (Cxa) placed between episternum and epimeron. Coxal articulation more heavily pigmented centrally. Eusternum and sternellum fused, bearing a paired, conspicuous, raised sclerite with two seta each (Estl). Posternellum not indicated.

Mesothorax wider than prothorax; metathorax wider than mesothorax. Sclerites and setae of meso- and metathorax not identical. Tergum divided by a groove running latero-ventrad to vicinity of spiracle. Cephalad of this groove is the prescutum which bears the mesothoracic spiracle, and three, secondary setae, one dorsal and two mid-ventral in position (Fig. 26, S 1, 2 and 3). Laterotergite (Lt) bearing three setae; a secondary seta on small sclerite (S 6) caudo-ventrad of and one (S 7) ventrad of laterotergite. Caudad of the groove is the scuto-scutellum bearing a row of nine, small, paired sclerites and two, paired, secondary setae. The three, dorsal sclerites bearing one seta each (Fig. 26, 1, 2 and 3). First, secondary seta (S 2) ventrad of third, primary seta. The two, dorso-lateral sclerites (4 and 5) bearing one seta each; the mid-lateral sclerites (6 and 7) having two setae on cephalic sclerite and one seta on caudal sclerite; the second, secondary seta (S 5) ventrad of this sclerite; the ventro-lateral sclerites (8 and 9) bearing one seta each. Episternum (Eps) bearing two, extremely small setae; epimeron bearing one well-developed seta. Sclerite articulating with coxa placed between episternum and epimeron. Postscutellum not indicated. Presternal sclerite not indicated. Sclerites of eusternum and sternellum paired and distinct. Eusternum with sclerites (11) separate and distinct bearing three well-developed setae; one seta on a small sclerite laterad from large, eusternal sclerite (11). The dextral half of eusternum differs from the above sinistral half in that it bears three sclerites instead of two; the cephalic and lateral sclerites bearing one seta each while the more mesal one bears two setae. Sclerites of sternellum (10) separate and distinct bearing two setae each. Poststernellum not distinguishable.

Metathorax differing from the mesothorax in that it bears no spiracle, secondary seta (S 2) is absent, sclerite (6) bears only one seta, laterotergite has only two setae, secondary seta (S 7) appears to be primary. Dextral epimeron bears two setae, the sinistral epimeron only one seta, and dextral half of eusternum with three sclerites, sinistral half with two.

Legs (Fig. 11) each consisting of coxa (Cx), femur (Fe), tibio-tarsus (Tb-Tr), a claw (Cl), and a pulvillus (Pu); well developed; imaginary lines connecting coxa diverging caudad.

Legs of prothorax slightly smaller than meso-legs, and meso-legs slightly smaller than meta-legs. Coxa of each leg articulated to sclerotized plate (Cxa) between episternum and epimeron. Lateral surfaces of legs more heavily pigmented; distal margins of each segment dark brown. Claw curved, pointed, spike-like; base not enlarged; margins smooth and regular. Pulvillus on ental tip of tibia-tarsus and removed from claw, grayish.

Abdominal segments one through eight divided into two transverse areas, the prescutum (Fig. 6, Prs) and the scutellum (Scl). Grooves separating the areas discernible, extending on either side not quite to a mid-dorsal line. Each area having a transverse row of small sclerites each bearing a seta. Sclerites more heavily pigmented than body. Prescuto-scutum (Fig. 26) bearing three paired, primary setae and two paired, secondary setae. First primary seta (1) dorsal, second (4) latero-dorsal, and third (6) lateral in position. First primary seta (S 1) cephalad of and nearer dorsal seta than latero-dorsal one. Second secondary seta (S 2) cephalo-ventrad from lateral primary seta. Scutellum having three paired primary setae and two paired secondary setae. First and second primary setae (2 and 3) in a dorsal position; the third (5) lateral. Secondary setae (S 3 and S 4) between second and third primary setae of scutellum. Laterotergite represented by a paired group of four small sclerites (7, 8, 9, 10) each bearing one seta. Pleuron with one paired sclerite (11) bearing one primary seta; two small paired secondary setae (S 5 and S 6) cephalo-dorsad from primary seta (11). A small area, apparently a pore, cephalo-dorsad from secondary setae (S 5 and S 6). Eusternum with one paired secondary setae (S 7) and a paired pseudopod bearing two setae. No sclerite or seta on sternellum. Abdominal laterotergal sclerites (Fig. 26, 7, 8, 9, 19) are located on a raised somewhat tuberculated portion of the pleura. In the first, sixth, and seventh segments there are four setae on this tuberculated area, but the seventh differs from the other two in having a small setae immediately ventrad of this area. The second, third, fourth, fifth, and eighth have three setae in this area; the fourth differs in not having a seta ventrad of tuberculated area.

Ninth abdominal segment narrowing and terminating laterally. No pseudopod therefore present. Prescuto-scutum with a single dorso-lateral seta; scutellum with a single dorso-lateral seta; scutellum with two paired primary seta more lateral in position than seta on prescuto-scutum; a single paired secondary seta mesad of two primary setae. Anal opening on ninth segment.

Tenth abdominal segment narrowed, directed ventrad as a pygopod. Several fairly small setae, about seven in number, on dorsal and dorso-lateral surfaces, a single paired lateral seta. Numerous minute setae on pygopod.

Lema sexpunctata Oliv.

(Described from larvae of various stages in vial No. 72 from National Museum. Marked "*Commelina communis* leaves, Bryn Athyn, Pa., 8–23, '33." No other data.)

Full grown larva.—About 7.0–7.5 mm. in length and 2.5–3.2 mm. in greatest width; legged subcylindrical and the caudal and curved abruptly ventrad; sides curbed, narrowed cephalad from first abdominal segment and caudad from fifth abdominal segment. First seven abdominal segments bearing small rather regularly arranged sclerites and setae; pigmentation of sclerites same as that of adjacent cuticula. Segments separated by grooves, no intersegmental belts or areas being discernible.

Head capsule brownish-yellow, marked with brown, pitted spots, mesal margin of gena smooth. Proximal half of mandibles yellow; distal half brownish. Ventral mouth parts pale yellow in color. Postmentum (Fig. 15, Mt + Smt) nearly covered by a sclerite with dorsal margins rather indistinct. A narrow band marks the dorsal margin of prementum (Prmt). Maxillary stipes bearing a large divided sclerite (St). General ground color pale yellow. All body sclerites difficult to distinguish, being the same color as body. Episternal sclerites, prothoracic tergal shield, and sternal sclerites, which are divided, evident. Coxacoria and pulvilli gray; claw brown. Peritreme of spiracles darker than adjacent cuticula. Body setae whitish.

Head hypognathus; cephalic aspect practically circular, but circular appearance not continuous ventrally from gena to gena. Cervix not apparent. Prothorax only slightly wider than head. Head capsule with distinct epicranial stem (Fig. 7, Eps). Vertex produced slightly dorsad on either side of stem. Epicranial arms (Epa) distinct through entirety; curving ventrolaterad and ending at caudal margin of antennal ring. Front (Ft) undivided and having five well-developed setae on each lateral half; two near junction of epicranial arms, the mesal one sometimes absent, a third on an imaginary line connecting ventral tip of epicranial stem and ventral margin of antennal ring, slightly closer to tip of stem than to antenna, a fourth as far dorsad of lateral margin of clypeus as distance to antennal ring, a fifth as far dorsad of dorsal margin of clypeus as from an imaginary mid-cephalic line. Each half of vertex (Vt) bearing eight well developed setae; setae one and two in a line with and alternating with three caudal ocelli, a third immediately dorso-cephalad from most dorso-cephalic ocellus, a fourth caudad of and about midway between most dorso-caudal ocellus and caudal margin of head capsule, a fifth immediately dorsad of fourth, a sixth about midway between most dorso-cephalic ocellus on ventral tip of epicranial stem, but slightly nearer epicranial stem, a seventh and eighth in a dorso-lateral position slightly more than one-third the dorso-lateral distance from epicranial stem to ocelli. Gena bearing two setae.

Clypeus (Fig. 7, Cl) about five times as broad as long and bearing four setae. Fronto-clypeal (Fcl) suture distinct for entirety. A carina borne on ventral margin of front and on ventral margin of clypeus. Labrum (Lb) separated from clypeus by a distinct clypeo-labral suture; not as broad as clypeus and being about three times as broad as long; bearing three setae on each lateral half. Ental aspect of labrum (epipharynx) (Fig. 21) bearing sixteen setae on each lateral half arranged in a paired row of six slightly laterad of a mesal line, paired mesal ones immediately dorso-laterad of dorsal tip of marginal cleft, and a ventral row of nine conforming to curvature of ventral margin of labrum, but the first and third most mesal ones more dorsal in position than adjacent setae. The ventral two in the mesal row of six branches at tip. Two pairs of sensoria (So) occur near meso-ventral tip. A creased area is present between the two rows of mesal setae.

Six ocelli present; a mid-lateral group of four and a ventral group of two on gena, all ocelli visible in cephalic aspect of head. Ocelli black.

Antenna (Fig. 8) short, two-segmented; segments reduced; sclerotized parts in form of small circular bands. Second segment bearing one papilla (Pap) and one cone-shaped, sensory appendix (Sap).

(*Continued in October Bulletin*)

TWO NEW MEMBRACIDAE FROM ARIZONA.

By W. D. Funkhouser, University of Kentucky, Lexington, Ky.

Two new species of Membracidae were collected by the writer on May 5, 1942, in the Santa Rita Mountains, forty-one miles south of Tucson, Arizona, at an elevation of about 5000 feet. The insects were taken in an oak forest in which were two species of oaks, the holly-leaved oak, *Quercus emoryi* and the Gambel oak, *Quercus gambeli.* It is not known from which of these oaks the specimens were beaten and therefore either or both are possible hosts.

The two new Membracidae are here described and figured as follows:

Stictolobus viridis sp. nov. (Figs. 1 and 2)

Pale green, immaculate, punctate, not pubescent; eyes dark brown; pronotum convex in front, rounded on dorsal surface; posterior process strongly deflexed and reaching two-thirds of the way from the internal angles to tips of tegmina; tegmina hyaline; veins of under wings black; undersurface and legs uniformly pale green.

Technical description:

Head triangular, smooth, pale green tinged with brown; base arcuate; eyes dark brown; ocelli large, light brown, equidistant from each other and from the eyes and situated slightly below a line drawn through centers of eyes; genae roundly sloping; clypeus triangular, smooth, a vertical brown stripe on each side, extending for one-third its length below inferior margins of genae, tip rounded and densely pilose.

Pronotum uniformly pale green, coarsely punctate, not pubescent; a deep, semicircular impression on each side; metopidium nearly vertical, broader than high; median carina weakly percurrent; humeral angles strong, blunt, triangular; dorsum rounded laterally, nearly straight from front to back; posterior process long, tectiform, strongly deflexed, tip sharp and reaching to a point two-thirds of the distance from the internal angles to the tips of tegmina.

Tegmina entirely exposed, hyaline; base narrowly coriaceous, opaque and punctate; veins broad; five apical and four discoidal cells; apical limbus wide and slightly wrinkled. Under wings hyaline with apical veins brown.

Undersurface and legs green; femora cylindrical; tibiae triquetrate with strong brown spines; larsi long; claws brown.

Length from front of head to tips of tegmina 7 mm.; width between humeral angles 2.7 mm.

Type: male.

Type locality: Madera Canyon, Santa Rita Mountains, Arizona.

Described from a single specimen. Holotype in author's collection.

In taxonomic position this species stands between *S. subulatus* Say and *S. trilineatus* Funkhouser. It differs from the former in having a rounded rather than a sharp dorsum and from the latter in being smaller and in having hyaline tegmina; it differs from both in being pale green in color and entirely without longitudinal stripes.

Xantholobus arizonensis sp. nov. (Figs 3 and 4)

Griseous, mottled gray and brown; not pubescent; pronotum slightly swollen behind the middle with an indentation before the swelling; dorsum straight; posterior process heavy, blunt, extending to base of terminal cell of tegmen; undersurface gray; legs griseous; tegmina hyaline with very broad veins.

Technical description:

Head triangular, gray with black puncturation, smooth; base weakly arcuate and feebly sinuate; eyes black; ocelli large, conspicuous, amber-colored, equidistant from each other and from the eyes and situated well below a line drawn through centers of eyes; genae sharply sloping and sinuate; clypeus gray with a brown stripe on each side, extending for half its length below inferior margins of genae, tip blunt and pilose.

Pronotum gray mottled with dark brown, smooth, not pubescent, somewhat swollen behind middle; lateral diagonal impression before middle; dorsum straight; dorsal surface rounded; posterior process short, heavy, blunt, tip brown and just reaching the base of the third apical cell of the tegmen; metopidium twice as broad as high, sloping, a large black horizontal stripe above each eye; median carina obsolete; humeral angles blunt, rounded, sub-triangular.

Tegmina one-third concealed under pronotum; hyaline; base narrowly opaque, coriaceous and punctate; veins very heavy and margined with black puncturation; five apical and three discoidal cells; base of third apical cell nearly straight; apical limbus broad, wrinkled, with apical margin brown.

Undersurface gray; legs gray with apices of femora and tibiae brown; femora cylindrical; tibiae triquetrate; claws dark brown.

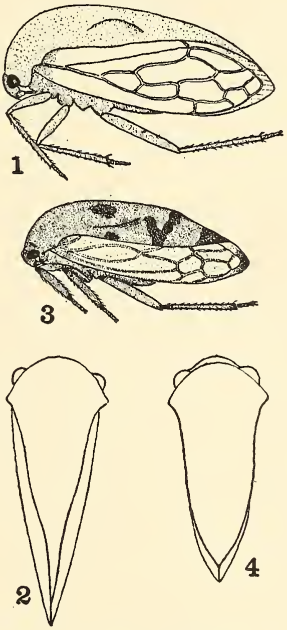
Length from front of head to tips of tegmina 5.9 mm.; width between humeral angles 2.6 mm.

Type: female.

Type locality: Madera Canyon, Santa Rita Mountains, Arizona.

Described from a single specimen. Holotype in author's collection.

This species seems to be most nearly related to *X. coconinus* Ball but differs from that species in being larger, darker, differently marked on the dorsum, in having black puncturation on the wing veins and having the apical margin of the tegmina brown.



Explanation of Figures.

Figure 1. *Stictolobus viridis*—Lateral view.
Figure 2. *Stictolobus viridis*—Dorsal outline.
Figure 3. *Xantholobus arizonensis*—Lateral view.
Figure 4. *Xantholobus arizonensis*—Dorsal outline.

NEW TACHINIDAE FROM NORTHEASTERN UNITED STATES (DIPTERA).[1]

By H. J. Reinhard, College Station, Texas.

This paper contains descriptions of six new genera and seven new species of tachinid flies mainly from New York and Ohio. The material, aside from my own collections, was received from several different sources as indicated under the descriptions. Most of the forms included have been in manuscript for some time and are published now to make the names available for another forthcoming paper covering the northeastern genera of this economically important family of parasitic flies. Types of the new species are in my collection.

Nimiocauda, n. gen.

A smallish cinereous species which belongs in Sturmiini and is readily distinguished from known North American genera by the peculiar structure of the female abdomen. The fourth segment of the latter is turned downward from base to tip at almost a right angle to the long axis of the preceding segments. In dorsal view the three visible abdominal segments are ovate in outline, about as wide as the thorax but distinctly shorter than same.

Female.—Head nearly one-third wider than high, oral margin axis about three-fourths antennal, which is slightly below middle of eye, frontal profile moderately sloped and a little longer than facial; front at vertex 0.25 and 0.24 of head width (two specimens), widening gradually to over one-third of same at lunula; frontal bristles weak, two beneath base of antennae not widely divergent from main row; orbitals two proclinate pairs; ocellars very small, proclinate; verticals two pairs, not very strong, inner decussate; eye practically bare, slightly oblique with lower edge nearly at level of vibrissae; antennae three-fourths length of face, basal segment short, third a trifle over twice length of second; arista micro-pubescent, proximal segments short; face weakly divergent downward, not deeply impressed, its ridges bare; parafacial bare, noticeably constricted near lower third thence somewhat widened downward; vibrissae decussate, on oral margin; cheek nearly one-fifth eye height; proboscis very short, labella large; palpi clavate, ordinary in size. Thoracic chaetotaxy: acrostichal 3, 3; dorso-

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[1] Contribution No. 773, Division of Entomology, Texas Agricultural Experiment Station.

central 3, 3; humeral 3; posthumeral 2; notopleural 2; presutural 2; intraalar 3; supraalar 3; postalar 2; intrapostalar differentiated; pteropleural 1 (small); sternopleural 2, 1; scutellum with 3 lateral and 1 small depressed discal pair, no apicals; prosternum and propleura bare; infrascutellum normally developed; sides of postnotum beneath calypters bare. Abdomen as described; basal segments each with one pair of median marginals; intermediate segments with one pair of discals, besides a marginal row on third; fourth segment with sparse weaker bristles irregularly spaced on entire upper surface; genitalia terminating in a blunt-tipped tubular organ which projects ventrally; sternites covered. Legs moderately long, weakly bristled; hind tibiae not ciliate; tarsi ordinary, claws and pulvilli short. Wings rather long, normal in shape; first vein bare, third with one hair near base; fourth vein with a sudden rounded stumpless bend near hind margin of wing, thence oblique toward third narrowly closing first posterior cell just before extreme wing tip; hind cross vein oblique to fourth which it joins a little nearer bend than small cross vein; last section of fifth vein short; costal spine distinct but not very long.

Genotype: **Nimiocauda erilis**, n. sp.

Nimiocauda erilis, n. sp.

Female.—Head blackish in ground color with subsilvery pollen; frontal stripe velvety black, slightly narrowed above middle, subequal parafrontal width; antennae reddish black, the ground color obscured by dense pale pubescent hairs on apical segments; arista moderately thickened near base, thence very slender to tip; palpi yellow; back of head gray pollinose, with some short black hairs above and longer denser pale ones below middle.

Thorax cinereous with four narrow but distinct black stripes which stop about midway between suture and base of scutellum; latter black with thick cinereous lusterless pollen; calypters semitransparent, white with a faint tawny tinge.

Abdomen wholly gray with a faint brownish tinge on hind margin of second segment, viewed from behind there is a round blackish spot at base of each large bristle and most of the smaller hairs; genitalia strongly protractile, not adapted for piercing.

Legs black, coxae reddish; middle tibia with one smallish bristle on outer front side near middle; hind tibia with a sparse row of four or five unequal bristles on outer posterior edge, one long below middle and a similar row of bristles along the inner posterior edge.

Wings subhyaline; veins including costa yellow; small cross vein slightly before apex of first; last section of fifth vein about one-fifth length of preceding section; costal spine a little shorter than small cross vein; epaulets and subepaulets blackish.

Length, 5–5.5 mm.

Holotype: Female, Wading River, L. I., N. Y., July 1924, no collector's label. Paratype, one female same data as type.

Aulicomyia, n. gen.

Differs from *Plagiomima* in having a short stout proboscis; bare parafacials; wing with first vein bare, hind cross vein not so strongly retracted, last section of fifth vein barely equal to or slightly over one-half length of preceding section; abdomen with discals; etc.

Female.—Head one-fourth wider than high, frontal profile flat and nearly equal length of moderately receding facial, vibrissal axis about three-fourths antennal, latter at eye middle or but slightly above; face moderately impressed, hardly widened downward, its ridges weakly bristled on lowest fourth or less; epistoma short, slightly bowed forward from clypeal plane; vibrissae stout, decussate, on level with oral margin; frontals in single rows which diverge widely beneath antennal base and descend almost to level with arista; two strong proclinate orbitals and two vertical bristles, outer one weak; ocellars strong, proclinate; parafacial bare, equibroad and about three-fourths clypeal width; antennae rather slender, reaching to lowest fourth of face, first segment erect and moderately elongate, third about two and one-half times length of second; arista bare, rather short, basal segments short but distinct; cheek two-fifths eye height; palpi moderately stout, equal length of haustellum; eyes bare. Thoracic chaetotaxy: acrostichal 2, 3 (none immediately in front of suture); dorsocentral 3, 3; intraalar 3; supraalar 3; postalar 2; intrapostalar well dedeveloped; notopleural 2; presutural 1 (outer); posthumeral 2; humeral 4; sternopleural 3; pteropleural 1 (smaller than sternopleural); scutellum with 3 large lateral (sometimes a smaller bristle next to basal one), 1 discal and 1 decussate apical of about equal size; no preapicals; propleura and prosternum bare; infrascutellum normally developed; sides of postnotum beneath calypters bare; hind lobe of calypter about as long as wide. Abdomen nearly as wide as thorax and tapering rather sharply to apex, arched in profile with anal segment noticeably deflexed, intermediate segments each with one pair of discals; basal segments bearing one pair of very strong median marginals and a complete marginal row of equally large macrochaetae on third; apical segment with scattered smaller bristles over most of upper surface; genitalia not adapted for piercing; sternites covered. Legs stout, strongly bristled; hind tibiae not ciliated. Wing broad, reaching slightly beyond tip of abdomen; first vein bare, third setulose two-thirds distance to small cross vein; fourth vein with an obtuse stumpless bend, thence oblique towards costa which it joins near apex of third well before exact wing tip; hind cross vein strongly oblique, reaching fourth about two-fifths distance from bend to small cross vein; fifth vein bare, last section barely exceeding one-half length of preceding; costal spine subequal length of small cross vein.

Genotype: **Aulicomyia invulnerata,** n. sp.

Aulicomyia invulnerata, n. sp.

Female.—Front at vertex 0.35 of head width (average of two specimens), widening uniformly downward to exceed eye width at antennal base; sides of front, face, and cheeks including posterior orbits yellow to pale golden pollinose; frontal stripe deep reddish brown, at middle about equal parafrontal width; antennae black with a reddish tinge in ground color basad of arista, latter strongly thickened to or slightly beyond middle; palpi yellow, hardly at all bowed or thickened apically; back of head moderately bulged, gray pollinose, clothed with pale hairs.

Thorax and scutellum black, gray pollinose, notum marked with four narrow dark vittae well defined before suture but less distinctly so behind; calypters opaque, white.

Abdomen subshining, black with extreme apex obscurely reddish, segments three to four dusted with changeable gray pollen except on narrow hind margin of each, venter wholly gray pollinose; genital opening caudoventral, elongate oval, terminating in a sharp ridge at upper extremity.

Legs stout, black with an obscure reddish tinge in ground color of tibiae, middle pair of latter with three or four stout bristles outer front side, median one longest; claws and pulvilli about three-fourths length of apical tarsal segment.

Wings gray hyaline with a slight yellowish tinge basally and along costa; veins including costa yellow; small cross vein well before apex of first; epaulets and subepaulets velvety black.

Length, 9.5 mm.

Holotype: Female, Amherst, Ohio, July 1933 (H. J. Reinhard). Paratype, female, same data.

Orphanotrophus, n. gen.

A rather minute, compact actiine species distinguished by sublinear cheeks; widely separated ocellars, set well forward; ocellar plate extending nearly to mid front, and row of proclinate orbitals in both sexes.

Head over one-third wider than high, facial profile moderately receding and slightly shorter than frontal, antennal axis near middle of eye and about two-fifths longer than vibrissal; front gradually narrowed upwards, and at vertex about one-third head width; frontals in a single row with lower two bristles divergent beneath antennal base; proclinate orbitals in a row of four to eight bristles, about as strong as frontals; ocellar triangle large extending almost to middle of front, bearing a pair of smallish proclinate bristles which are set rather far apart and well forward; verticals two pairs, not very strong, inner ones suberect; face hardly impressed, its ridges flattened and strongly divergent downward, bearing bristly hairs on lowest fourth; parafacial bare, almost linear below; antennae reaching to lower fourth of face, first segment short, third about one and one-half times length of second; arista bare, proximal segments short; vibrissae slightly above oral margin, decussate; eyes large, extending well below level of vibrissae, practically bare; cheek sublinear in profile; proboscis very short, labella large, fleshy; palpi slender, longer than haustellum. Thoracic chaetotaxy: acrostichal 3, 3; dorsocentral 2, 3; intraalar 3; supraalar 3; notopleural 2; humeral 2–3; posthumeral 2; presutural 2; postalar 2; intrapostalar differentiated; pteropleural 1 (small); sternopleural 2, 1; scutellum with 3 lateral and 1 small discal pair, apicals reduced to minute hairs; propleura bare; prosternum bare or at most with one or two hairs at sides; infrascutellum normally developed; sides of postnotum beneath calypters bare. Abdomen short, ovate, slightly wider than thorax; intermediate segments without discals; first and second segments bearing one pair of good-sized median marginals, third and fourth each with a marginal row, besides a row of discals set well behind middle on last; sternites covered; female genitalia not adapted for piercing.

Legs weakly bristled, hind tibiae not ciliated. Wings ordinary in size and shape; first vein bare, third with two small hairs near base; first posterior cell open shortly before extreme wing tip; last section of fifth vein less than one-third length of preceding section; costal spine vestigial.

Genotype: **Orphanotrophus orbitalis,** n. sp.

Orphanotrophus orbitalis, n. sp.

Male.—Front at vertex 0.36 of head width and widening but slightly downward; frontal vitta broad, velvety black; parafrontal blackish, almost subshining above middle but lightly dusted with brownish gray pollen below; antennae black, second segment with a slight reddish tinge, third moderately slender, straight on front edge and rounded on apex; arista thickened on proximal two-fifths, middle segment about as wide as long; face gray pollinose on blackish ground color; parafacial with dense brownish pollen; verticals two pairs and a row of six or more proclinate orbital bristles near outer margin of front; cheek thinly gray pollinose on black ground color, beset with black bristly hairs; back of head flattened, blackish and thinly gray pollinose, sparsely clothed with short pale hairs and a few black ones intermixed above; posterior orbits very narrow, with a short inconspicuous fringe along hind margin.

Thorax and scutellum black, lightly dusted with gray pollen which in dorsal view appears denser on the humeri; notum not vittate behind suture; calypters semitransparent, with a rather uniform tawny tinge but hind lobes sometimes paler at middle.

Abdomen black, subshining, last three segments with thin grayish pollen which extends over most of upper surface on each and changes from light to dark when viewed in opposite angles; hairs on intermediate segments above depressed; genitalia black, retracted; fifth sternite divided, lobes black, clothed with fine concolorous hairs.

Legs black; mid tibia with one bristle on outer front side near middle; claws and pulvilli short.

Wings gray hyaline; fourth vein with an obtuse stumpless bend, thence slightly concave and narrowly closing first posterior cell before wing tip; hind cross vein nearly perpendicular to fourth which it joins about midway between small cross vein and bend; epaulets blackish.

Female.—Front at vertex 0.31 of head width, widening uniformly downward to about eye width at antennal base; four proclinate orbitals in a row near outer margin of front; ocellar bristles set slightly before anterior ocellus; pollen on parafrontals and parafacials more grayish than in male; thorax marked with four dorsal broad black vittae before suture; otherwise very similar to male.

Length, 4.5 mm.

Holotype male, and allotype female, Amherst, Ohio, July 1933 (H. J. Reinhard). Paratypes: one female, same data as type and one male, "Douglas Co., Kan., 900 ft., F. H. Snow" in the Kansas University Collection.

Carinosillus, n. gen.

Similar to *Opsotheresia,* but considerably less robust in build; abdomen with discals on apical segments; haustellum hardly exceeding one-half head height; hind tibiae not ciliated.

Head not much wider than high, with long horizontal ventral profile at right angle to occipital; frontal profile strongly sloped, nearly two-fifths longer than facial; oral margin axis slightly longer than antennal, which is well below eye middle; face moderately excavated on sides with a high wide median carina, which is rounded on crest and bulged in profile; epistoma somewhat produced downward and forward, as wide as clypeus; facial ridges flattened, with a few bristly hairs next to vibrissae, latter not very strong and set considerably above oral margin; parafacial bare, equibroad and subequal clypeal width; male vertex narrowed to width of ocellar triangle, which bears a cluster of proclinate hairs but no differentiated bristles, female vertex subequal eye width, outer verticals and ocellars small but distinct, three proclinate orbitals; frontal bristles weak, in a single row extending to antennal base and becoming vestigial near vertex; bases of antennae well separated, first segment very short, third reaching only to middle of face and about one-half longer than second segment; arista shorter than antennae, moderately long plumose to tip, proximal segments short; palpi slender but short and somewhat laterally compressed in male, slightly longer in female with tips barely swollen; haustellum setose, moderately stout and tapered apically; eyes bare, slightly oblique not quite reaching to vibrissal level; cheek two-fifths to one-half eye height. Thoracic chaetotaxy: acrostichals variable, usually 2, 3; dorsocentral 3, 4 (two just behind suture sometimes small); humeral 4–6; posthumeral 2; notopleural 2; presutural 1 (outer); supraalar 3; intraalar 2 (none near suture); postalar 2; intrapostalar not developed; sternopleural

2, 1; pteropleural in cluster of 2–5 (all smaller than sternopleural); scutellum with 2 large lateral, 1 almost equally long decussate apical pair, disk with several irregularly spaced good-sized bristles; infrascutellum strongly developed; propleura pilose; prosternum and sides of postnotum beneath calypters bare. Abdomen rather short, wider than thorax, weakly bristled; first segment without median marginal bristles, second with one pair in female and usually two pairs in male; third segment with marginal row and several irregularly spaced discals which are not differentiated in female; anal segment with erect bristles and hairs on entire upper surface; hypopygium large, bowed forward under tip of abdomen and partly retracted; sternites covered. Legs slender, elongate, weakly bristled; male claws and pulvilli subequal length of apical tarsal segment, shorter than same in female. Wings not very wide at base and little narrowed apically; first posterior cell narrowly open shortly before extreme wing tip; fourth vein with rounded stumpless bend quite near hind margin of wing; hind cross vein oblique, nearer bend than small cross vein; last section of fifth vein very short; costal spine not developed.

Genotype: **Carinosillus pravus**, n. sp.

Carinosillus pravus, n. sp.

Male.—Front at vertex 0.12 of head width (average of three specimens), widening rapidly from middle to antennal base; head largely blackish in ground color with subshiny gray pollen, cheek grooves red, this color extending diagonally upwards from lower edge of eye to arista and contrasting with the black part of parafacial; frontal vitta deep reddish to black, broad at antennal base tapering upward and nearly linear at ocelli; antennae black with reddish tinge in ground color to arista, second segment with one long slender bristle on front side near middle; arista shorter than antennae and somewhat bowed, moderately swollen base brownish thence paler or yellow to slender tip; palpi reddish brown, with several longish hairs near tips; back of head flat, gray pollinose, clothed with pale hairs.

Thorax and scutellum black, gray pollinose, notum marked with three broad black vittae, latter not broken at suture and defined to base of scutellum; calypters semitransparent, white with a tawny tinge.

Abdomen wholly gray pollinose above, first three segments black, following one or anal segment orange red usually with a triangular black spot at middle on basal margin above; genital segments also largely reddish; inner forceps rather small divided beyond middle into two slender acute-tipped and slightly divergent prongs; outer forceps much broader and blunt-tipped; fifth sternite rather prominent, pale reddish yellow, with broad deep V-shaped apical incision, lobes moderately black-haired.

Legs black; middle tibia with one or two very small bristles on outer front side near middle; tarsi elongate, slender, pulvilli grayish white.

Wings hyaline with a faint tawny tinge near base and on costal margin; third vein with one or two minute hairs near base; epaulet black, subepaulet pale yellow.

Female.—Front at vertex 0.31 of head width, widening gradually forward to antennae; frontal vitta red, slightly narrowed toward vertex, wider than parafrontal on entire length; cheek one-half eye height; abdomen broad ovate, anal segment not so strongly bristled as in male; genitalia caudoventral, not adapted for piercing.

Length, 10–12 mm.

Holotype male and allotype female, Ithaca, N. Y., July 18, 1921 (L. S. West), in the Cornell University Collection. Paratypes: 2 males and 5 females, Ithaca, N. Y.; July 14, 1921 and August 19, 1922 (L. S. West); July 11, 1935 (K. V. Krombein); and June 16, 1936, without collector's label.

Vibrissotheresia, n. gen.

Allied to *Opsotheresia,* but without differentiated vibrissae; proboscis distinctly shorter than head height; eyes in male nearly contiguous above; hind tibiae not ciliated, etc.

Head slightly wider than high, antennal axis just below eye middle and a trifle shorter than oral; frontal profile strongly arcuate, hardly one-third longer than facial; front at vertex reduced about to width of raised ocellar triangle, narrowed downward nearly to width of anterior ocellus thence widening rapidly to antennae; face with a strong carina, rounded on crest and highest at aristal level; epistoma moderately produced, fully as wide as clypeus; facial ridges flattened, with a few hairs on lower extremity; parafacial bare, about one-third clypeal width, frontal bristles in a single row stopping at base of antennae, uppermost small or hairlike at narrowest part of front before triangle; latter with a pair of strongly proclinate bristles, not at all divaricate; inner verticals rather weak, erect and decussate; antennae separated at bases, first segment very short, third barely twice length of second which bears a long slender bristle near middle of outer front side; arista long plumose to tip; proboscis moderately stout, haustellum about one-half head height; palpi cylindric, long and slender; eyes bare; cheek nearly one-third eye height. Thoracic chaetotaxy: acrostichal 0, 2; dorsocentral 3, 4; intraalar 2 (none near suture); supraalar 3; humeral 2; notopleural 2; presutural 1 (outer); posthumeral 1; postalar 2; sternopleural 2, 1; pteropleural 1 (smaller than sternopleural); scutellum with 2 lateral, 1 strong decussate apical and 2 smaller discal pairs; infrascutellum normal in size, membranous above; prosternum bare; propleura with a few hairs at middle. Abdomen stout, subconical, weakly bristled; first segment without, second with one pair of median marginals; third and fourth segments each with a marginal row; segments two and three without distinct discals but latter with some erect irregular bristly hairs at middle above; sternites covered. Legs long and slender; male claws and pulvilli subequal length of apical tarsal segment. Wings extending well beyond apex of abdomen; first vein bare, third without the usual setulae near base; fourth vein with a rounded stumpless bend near hind margin of wing, thence nearly parallel with latter narrowly closing first posterior cell slightly before exact wing tip; small cross vein well before apex of first; last section of fifth vein short; hind cross vein oblique, joining fourth about three-fifths distance from small cross vein to bend; no costal spine.

Genotype: **Vibrissotheresia pechumani**, n. sp.

Vibrissotheresia pechumani, n. sp.

Male.—Head black with satiny yellowish gray pollen on sides of front and face, latter with a small reflecting dark spot just below frontal bristles which changes to silvery when viewed from below; cheeks thinly gray pollinose, reddish in ground color along grooves above, sparsely black-haired; frontal stripe deep red, tapering sharply upwards from antennae and reduced to almost a line at ocellar triangle; antennae wholly black, hardly reaching lowest third of face, third segment narrower than parafacial, slightly bulged on front edge near apical third, apex rounded; arista pale yellow darker on thickened basal part, proximal segments short; face thinly gray pollinose on black ground color, excavated on sides of median carina, not much widened below; vibrissae not at all developed; epistoma broad, protuberant with front margin almost in line with lower edge of head; palpi dark brown, about as long as haustellum; latter shiny, setose, moderately tapering, labella fleshy, not very large; posterior orbits with a deep oblique groove near eye middle; back of head gray pollinose, clothed with short black hairs above and longer, denser pale hairs below.

Thorax black, gray pollinose; notum with three broad black stripes extending from anterior margin to base of scutellum; latter black, dusted with thin changeable whitish pollen; calypters semitransparent, with a uniform light brown tinge; sides of postnotum beneath calypters bare.

Abdomen black with anal segment largely reddish yellow, thinly gray pollinose on entire upper surface, viewed from behind the changeable pollen shows a slight brownish tinge and a narrow dark median stripe on intermediate segments; genital segments moderately large, reddish, sparsely beset with fine black hairs; inner forceps short, divided and divergent beyond middle, base behind moderately raised on median line and clothed with black hairs; outer forceps much larger, with broad paler basal part nearly bare; fifth sternite black and thinly pollinose, lobes strongly divergent, beset with short black hairs and a few long slender bristles.

Legs black, weakly bristled; hind tibia with two small bristles on outer posterior side and mid tibia with two still smaller ones on outer front side near middle; front coxae rather long, bearing some good-sized bristles; tarsi long, slender; pulvilli slightly infuscated.

Wings subhyaline with a brownish tinge near base; epaulets black, subepaulets pale yellow. Female not known.

Length, 9 mm.

Holotype: Male, Brewster, N. Y., July 2, 1937, collected and donated by Dr. L. L. Pechuman, for whom the species is named.

Pacidianus, n. gen.

A medium-sized densely cinereous pollinose species with thickly pilose eyes, which extend beneath vibrissal level near lower border of head; antennal axis at middle of eye; first vein of wing bare; male only. Related to *Houghia* and *Macrohoughia.*

Head nearly one-third wider than high, facial profile moderately receding and subequal length of arcuate frontal, oral margin axis about three-fifths antennal; front equibroad and nearly equal eye width; outer verticals well developed, inner ones large, suberect; two large proclinate orbitals; ocellars strong, proclinate; frontals in a single row near edge of median vitta, one or two bristles beneath base of antennae; face moderately deeply impressed diverging downward, its ridges rather sharp with bristly hairs ascending to slightly above middle; epistoma short, not narrowed from clypeus and in plane of same; parafacial bare, narrowed below; antennae reaching nearly to vibrissae on oral margin; arista long, bare, basal segments short; proboscis short, labella large; palpi clavate, slightly upturned beyond middle; cheek very narrow, about one-twelfth eye height. Thoracic chaetotaxy: acrostichal 3, 3; dorsocentral 3, 4; intraalar 3; supraalar 3; notopleural 2; presutural 2; posthumeral 2; humeral 3–4; postalar 2; intrapostalar well developed; sternopleural 1, 1; pteropleural 1 (smaller than sternopleural); scutellum with 3 lateral, 1 smaller decussate apical and 1 discal pair; prosternum haired; propleura bare; infrascutellum normally developed; sides of postnotum beneath calypters bare. Abdomen at base slightly wider than thorax and rather strongly narrowed toward apex; segments one and two bearing a pair of median marginal bristles, three and four each with a marginal row besides a discal row on last; sternites mostly covered. Legs moderately slender; hind tibiae ciliated; claws and pulvilli less than one-half length of apical tarsal segment. Wing slightly narrowed beyond middle, ordinary in size; third vein setulose over halfway to small cross vein; bend of fourth vein broadly rounded, without stump or fold; first posterior cell open well before wing tip; last section of fifth vein short; hind cross vein nearer bend than small cross vein; latter far before apex of first vein; costal spine minute.

Genotype: **Pacidianus hirsutus,** n. sp.

Pacidianus hirsutus, n. sp.

Male.—Front at vertex 0.31 of head width, hardly any broader at base of antennae; face widening gradually downward from aristal level; parafrontal gray pollinose, moderately clothed with erect longish black hairs; frontal vitta blackish, slightly narrowed toward triangle and at middle about three-fifths as wide as one parafrontal; face concolorous with front but parafacials more shining or satiny in direct view; antennae black, first segment short, third rather slender, five times longer than second; arista as long as antennae, thickened on basal third or less, blackish; cheeks gray pollinose on reddish ground color, sparsely clothed with black hairs; palpi yellow, darker basally, rather thickly long-haired beyond middle; labella pale yellow, haustellum brownish black, nearly as broad as long; back of head flat, gray pollinose, clothed with whitish hairs.

Thorax black, gray pollinose rather densely clothed with longish erect hairs and marked above with four narrow but distinct velvety black stripes, inner pair widely separated and stopping shortly behind suture; calypters opaque, white.

Abdomen black, last three segments wholly cinereous pollinose above with changeable blackish spots on the intermediate ones visible in most views, hairs on same erect and half as long as macrochaetae; ventral surface of two apical segments subshiny, bearing a vestiture of fine brownish black hairs; genitalia blackish, retracted, fifth sternite inconspicuous.

Legs blackish; cilia of hind tibia with one longer and stouter bristle in row slightly beyond middle; tarsi normal; middle tibia with one good-sized bristle near middle on outer front side; pulvilli short.

Wings subhyaline; venation yellow; epaulet and subepaulet black. Female not known.

Length, 9 mm.

Holotype: Male, Ag. Coll. Mich., April 21, 1922 (L. G. Gentner).

Pacidianus persimilis, n. sp.

Male.—Differs from the preceding species, mainly as follows: Eyes thinly short-haired; facial ridges weakly bristled on lower two-fifths; third antennal segment about four times longer than second; thorax above with sparser vestiture of shorter hairs and three sternopleurals; abdomen wholly covered with thick cinereous pollen above, which is without pattern but sharply limited on sides of last two segments, latter subshining beneath and clothed with soft appressed pile; hairs on intermediate segments short, decumbent and rather coarse. Length, 8.5 mm.

Holotype: Male, Babylon, L. I., N. Y., September 4, 1936 (Blanton and Borders). Paratype: Male in the Canadian National Collection, "ex *A. rubicunda,* Klock, Ont. F. I. Survey 1940. Em. (Incubator) 16–III–1941".

TWO NEW NEARCTIC OXYBELUS (HYMENOPTERA, SPHECIDAE).

By V. S. L. Pate, Cornell University, Ithaca, N. Y.

Descriptions of the following new and distinctive Nearctic species of *Oxybelus* are presented here in order that they may be available in connection with other investigations.

Oxybelus rancocas[1] n. sp.

The apparently tridentate postscutellum caused by the slender falcate squamae and the caudally produced median carina; the spiniform mucro; and the truncate clypeus readily differentiate *rancocas* from all other described Nearctic *Oxybelus*.

Type.—♂; Atco, Camden County, New Jersey. May 21.

Male. 4 mm. long. More or less opaque black; the following stramineous: a minute spot at each lateral angle of the pronotum, squamae on inner distal two-thirds, a very small spot laterally on first abdominal tergite. Castaneous: trophi, mandibles except red apices, clypeal lobe apically. Legs dark castaneous, with tarsi fulvescent. Scape and pedicel brunneous; flagellum largely fulvous. Last two abdominal tergites fulvous. Wings clear hyaline, iridescent; veins and stigma fulvotestaceous.

Head subfulgid; suborbicular in anterior aspect; clypeus and front with a moderate vestiture of appressed silvery hair; vertex and temples with a thinner clothing of similar pubescence. Front simple, flat, transversely arcuately striatopunctate, width at distal end of scapes three-fourths the vertical eye length; vertex finely, transversely striatopunctate; ocelli in a very low triangle, the ocellocular line one-half the postocellar distance; temples finely, vertically striate; temporal carinae very feebly indicated; post-temporal and gular regions subnitidous. Antennae with scapes obterete, almost four-tenths (0.385) the vertical eye length; pedicel subcylindrical, subequal in length to first flagellar article; flagellum simple, finely puberulent, very weakly incrassate distad, second segment three-fourths the length of first, ultimate article simple, terete, twice as long as penult segment; interantennal line seven-eighths the antennocular distance. Clypeus finely punctate, median length four-ninths (0.44) the vertical eye length; flat laterally to gently tumid discally, bisected by a low arched nitidous keel which terminates in the small, bluntly mucronate tooth of the sharply truncate, imbevelate median lobe, the apical margin of which is glabrous, nitidous, and the width one-half the vertical eye length. Mandibles falcate; inner margins on basal third with a low, weak dentiform angle.

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[1] After the Rancocas Indians, a division of the Delawares, who formerly inhabited Burlington and Camden Counties, New Jersey.

Thorax subfulgid; with a moderate vestiture of short, decumbent hair, and moderately fine, close puncturation throughout. Pronotum very short; anterior dorsal margin with a transverse high cristate carina, notched medially, abruptly interrupted at lateral angles, then continued on tubercles. Mesonotum simple, posterior sixth bisected by a longitudinal carinule; scutellum transverse, subquadrate, lateral margins with pellucid flanges, bisected by a very strong carina; postscutellum transversely sublinear, very short, one-fourth the length of scutellum, bisected by a high erect laminate carina which projects caudad over base of mucro, length of this carina from base of postscutellum to its apex two-thirds that of scutellum; squamae slender, falcate, simple, flat, ecarinulate, subequal in length to scutellum. Mucro very slender, spiniform, subequal in length to scutellum, channeled above, apex narrowly truncate. Mesopleura substriatopunctate; prepectus very sharply margined anteriorly; episternal suture impressed, weakly foveate; mesopleural pit weak; hypersternauli weakly impressed; sternostirae not appreciably developed; metapleura horizontally striate; mesosternum broadly rounded anteriorly. Propodeum subfulgid; lateral areas of dorsal face with a thin and inconspicuous vestiture of light puberulent hair; dorsal face finely subgranulate, traversed by fine oblique, subparallel rugulae; posterior face discally with a large, ventrally stalked, obtrigonal areole, glabrous and nitidous within, open and with fine oblique rugulae above, lateral areas with fine, horizontal, subparallel rugulae which on upper half are continuous onto lateral faces; lateral carinae well developed along dorsal face, and distinct, simple, not forked below, along lower half but obsolete along upper half of posterior face; lateral faces finely subgranulate, with superposed subhorizontal, subparallel, fine rugulae.

Legs simple. Fore tibiae with a few weak spines on outer faces; fore metatarsi with four weak spines. Middle and hind tibiae moderately spinose on outer faces.

Abdomen subfulgid; with a thin vestiture of short, decumbent, silvery hair, most noticeable along caudal margins of tergites; weakly constricted between segments. Tergites with close, moderate puncturation throughout; first bisected by a weak and inconspicuous impression; latero-apical spines absent, weakly indicated on fifth and sixth tergites, the latter in addition with sharp dorsolateral carinule laterally. Pygidium subrectangular, slightly longer than broad, disc coarsely punctate, apex gently rounded out. Sternites fulgid, more sparsely punctate than tergites.

Female. Unknown.

Paratype: Camden County, New Jersey; June 28, 1891: 1 ♂; [USNM].

Oxybelus cochise[2] n. sp.

The superficial habitus of *cochise* is very similar to that of *cornutum* but is readily differentiated from that form by the strong and continuous pronotal carinae, unbroken at the lateral angles as they are in *cornutum,* the presence of distinct dorsolateral carinules apically on the penult abdominal tergite, and the quinquedentate rather than tridentate clypeal lobe of the males.

Type.—♂; Steins, Hidalgo County, New Mexico. July 14, 1917. [J. C. Bradley and J. Bequaert; on pods of *Acacia Greggii* (Cat's-claw).]

Male. 4.5 mm. Black; the following citrinous: mandibles except red apices, pronotal dorsum entirely to and including tubercles, inner margins of squamae, fore and middle femora below, fore and middle tibiae entirely, hind tibiae on outer faces, and all tarsi; and abdomen with a large quadrate to ovate spot laterally on first four tergites. Castaneous: clypeal lobe apically, and pedicel. Scape brunneous; flagellum at base fulvous beneath, brunneous above, becoming entirely bright fulvous apicad except last article which is abruptly brunneous. Tegulae and axillary sclerites bright fulvous. Wings clear hyaline, iridescent; veins and stigma light brunneous.

Head subfulgid; clypeus clothed with dense appressed silvery sericeous pile; front, vertex and temples of appressed silvery hair. Front flat to gently tumid, simple, with moderately coarse, separated puncturation, width at distal end of scapes five-ninths the vertical eye length; vertex with puncturation similar to but slightly coarser than front; ocelli situated in a very low, broad triangle, hind ocelli along inner anterior margins strongly tumid and subnitidous, ocellocular line three-

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[2] After Cochise, the Chiricahua Apache Indian chieftain.

tenths the postocellar distance; with a median, perfulgid, nitidous, glabrous tubercle behind postocellar line; temples rather finely striato-punctate; temporal carinae absent. Antennal scapes incrassate distad, one-third the vertical eye length; pedicel suborcate, four-fifths the length of first flagellar article; flagellum simple, finely puberulent, second segment four-fifths the length of first, last article twice the length of penult segment; interantennal line five-sevenths the antennocular distance. Clypeus short, transverse, median length about one-fifth (.177) the vertical eye length; flat and attenuate laterally, disc bisected by a rostriform keel ending in the median tooth of the preapically tridentate median lobe, the apex of which is furnished with an inflexed, nitidous, transversely linear, concave bevel quinquedentate at apex. Mandibles slender, falcate; apices simple; inner margins edentate.

Thorax more or less fulgid; with close, moderately coarse, setigerous punctures on dorsum and pleura; dorsally with a moderate vestiture of reclivous argenteo-aeneous hairs, pleura more noticeably clad with appressed silvery hair. Pronotum short, transverse; dorsal surface flat, sharply carinate anteriorly to and including the tubercles, the lateral angles sharply angulate, the carina continuous, not interrupted there. Mesonotum simple; suture between mesonotum and scutellum impressed, foveolate; axillae small, immarginate; scutellum transversely subsemicircular, gently tumid, coarsely punctate, bisected by a longitudinal carinule, lateral edges strongly marginate; postscutellum one-half length of scutellum, bisected by an erect laminate keel; squamae large, stoutly subfalcate, outer halves pellucid and transversely carinulate, apices acute, posterior (inner) margins concave, alobate. Mucro spiniform, seven-eighths the length of scutellum, canaliculate above, apex acute. Mesopleura with prepectus very sharply margined anteriorly; episternal suture foveolate; hypersternauli not apparent; each sharp vertical precoxal carina with a well developed, bisinuate sternostira running obliquely forward and beneath to the very sharply margined anterior edge of mesosternum; metapleura fulgid, glabrous, with parallel horizontal costulae. Propodeum subopaque; dorsal face minutely subgranular basically, with a sparse and inconspicuous vestiture of fine puberulent hair, the lateral areas bisected by an oblique carinule (a continuation of the lateral margins of discal areole of posterior face) and traversed by more or less regular, subparallel, fine carinules; posterior face on disc with a large sharply margined sublyriform areole, long-stalked ventrally, glabrous and nitidous within, open above, lateral areas with fine, semiconfluent punctures; lateral carinae well developed for entire length, sublaminate above, simple, not forked below; lateral faces fulgid, subnitidous anteroventrally but posteriorly and above with a few widely separated, subparallel, horizontal costulae.

Legs: fore metatarsi with four weak spines. Middle tibiae moderately, hind tibiae strongly, spinose on outer faces; hind femora with a sharp sublaminate fornicate keel above at apex.

Abdomen fulgid; with a moderate vestiture of short, decumbent, light hair; strongly constricted between segments. Tergites with rather coarse and close, setigerous punctures throughout; third to sixth inclusive with strong latero-apical spines; penult with well developed dorsolateral carinules apically; pygidium elongate subrectangular, disc coarsely punctate. Sternites perfulgid, more sparsely punctate than tergites.

Allotype. ♀; Topotypical. Same data as type.

Female. 7 mm. long. Similar to male (type) except in the following features:

Livery: antennal scape and last flagellar article fulvous. Fore legs distad of coxae fulvous. Middle femora with a stramineous streak below from apex. Middle tibiae and hind legs entirely black. Abdomen with lateral tergal spots narrower and more elongate, the fourth tergite with a preapical fascia; last segment rufescent.

Head in general the same, but width of front at distal end of scapes four-fifths the vertical eye length; ocellocular line three-eighths the postocellar distance. Antennal scapes two-fifths the vertical eye length; pedicel five-sevenths the length of first flagellar article; flagellum with second segment six-sevenths the length of first, last article one and four-fifths the length of penult segment; inter-antennal distance six-sevenths the antennocular line. Clypeus with median length three-tenths the vertical eye length, discally with a sharp, compressed, porrect tubercle; median lobe with a weakly concave, transversely linear, glabrous, nitidous bevel which is immarginate above, the apex subtruncate to inconspicuously arcuate, the lateral angles sharp and acute, and laterad and separated from these with a pair of short, sharp teeth on each side.

Thorax in general as in male. Sternostirae absent; postscutellum one-third the length of scutellum. Mucro three-fourths the length of scutellum.

Legs with fore tarsi slightly flattened and with a pecten of seven strong stiff spines. Middle and hind tibiae strongly spinose on outer faces; hind femora very strongly fornicate at apex.

Abdomen as in male but more finely punctate; without lateroapical spines on tergites. Pygidium elongate trigonal, the apex broadly rounded, clothed with appressed, flattened, glistening silvery setulae.

Specimens examined: 13; 10 males, 3 females, as follows:

TEXAS: Sierra Blanca, Hudspeth Co.; elevation, 4509 ft.; July 9, 1917; (R. C. Shannon): 2 ♂. NEW MEXICO: Las Cruces, Don Ana Co.; elevation, 3883 ft.; August 28; (T. D. A. Cockerell): 1 ♂; [USNM]. Steins, Hidalgo Co.; July 14, 1917; (Bradley & Bequaert; on pods of *Acacia Greggii* [Cat's-claw]): 2 ♂, 2 ♀. ARIZONA: Fort Grant in Pinaleño Mts., Graham Co.; elevation, 4828 ft.; July 18, 1917: 1 ♂, 1 ♀. Dragoon, Cochise Co.; elevation, 4614 ft.; July 20, 1917; 1 ♂. Tucson, Pima Co.; elevation, 2389 ft.; (F. H. Snow): 1 ♀; [KU]. (C. F. Baker: no. 2572; no other data): 1 ♂; [USNM]. CALIFORNIA: Riverside; July 26, 1938; (P. H. Timberlake; on *Eriogonum fasciculatum*): 1 ♂; [Timberlake].

The paratypes agree with the typical pair in all essential details of livery and structure save that the Sierra Blanca specimens are somewhat cyanided.

Notes on Heliothiinae—Schinia tuberculum Hbn.—Several years ago, Mr. George P. Engelhardt turned over to me some heliothid moths which he had taken at Coram, Long Island, N. Y., in mid-August, 1920. In August 1938, I visited Coram and in the course of an active morning took ten specimens of this moth. They occur in a sandy five acre field, in association with the sickleleaved golden aster, *Chrysopsis falcata* (Pursh) Ell. Although a careful search of the asters in the surrounding neighborhood never turns up any specimens, a checkup each subsequent year indicates that *tuberculum* still persists in this field, twenty-two years after Mr. Engelhardt's original capture of specimens. Relatively few in number as they always seem to be and narrowly restricted in habitat, this local survival of *tuberculum* suggests the tenacity of existence of seemingly fragile Lepidoptera.—ROWLAND R. MCELVARE, Port Washington, L. I., N. Y.

NOTES ON THE BIOLOGY OF CHYLIZA NOTATA (DIPTERA, PSILIDAE).

By L. L. Pechuman, Medina, New York.

Chyliza notata seems to be widely distributed but little seems to be known of its habits. While working on the biology of insects which were potential vectors of the Dutch elm disease fungus, certain incidental information was picked up on *C. notata* which may be of interest to other workers.

The adults of *C. notata* are attracted to exposed wounds on the trunk, branches or cut logs of elm. They apparently feed on the sap and then oviposit around the margins of the wounds. The larvae tunnel between the bark and wood into the healthy tissue, forming broad gouged out areas around the wound. Large numbers of larvae are sometimes found around a single wound. When development is complete, the puparium is formed under the bark.

The length of the life cycle is apparently quite variable, and is probably correlated with the amount of moisture present. In one rearing cage, larvae developing from eggs laid during the last two weeks of June, gave rise to adults the last part of May of the following year. In another cage, a single specimen of *C. notata* emerged on July 3rd from a log which had been exposed to attack during the last week in May and the first week in June of the same year; in this case development from egg to adult was completed in about one month. However, this same material produced another adult on May 22nd of the following year; nearly a year was required to complete the life cycle of this individual.

Most of the emergence of *C. notata* from caged material was in May, but adults were found to be common in the field in July and August as well.

C. notata probably is not of importance as a vector of the Dutch elm disease fungus, but theoretically it could carry the organism from tree to tree. If coremia were formed in the broad patch-like tunnels of the larvae, the emerging adults might easily pick up the spores and carry them to wounds on healthy trees. It is possible also that feeding adults might pick up spores from the sap of a diseased tree and carry them to a wound in a healthy tree. In a favorable situation it is possible that the spores might germinate and produce infection.

POLITICAL VERSUS FAUNAL BOUNDARIES IN SYSTEMATIC ENTOMOLOGY.

By E. Gorton Linsley, University of California,
Berkeley, Calif.

Mr. J. R. de la Torre-Bueno,[1] in a recent number of this journal, has called attention to inconsistencies in the current treatment of the overlapping faunas of Mexico and the United States. The present writer is in full sympathy with the arguments propounded by Mr. Torre-Bueno. However, before we can arrive at a satisfactory solution to the problem, it would seem desirable to determine just how the prevailing practice has arisen and what practical difficulties exist which may influence future procedure.

It appears to me that there are four main reasons for the present practice in treating these faunas. The first is *tradition.* We draw a taxonomic line between Mexico and the United States because it has been traditionally drawn by our entomological forebears. This is in marked contrast to the absence in systematic work of a boundary between Canada and the United States. Yet, oddly enough, the Mexican boundary has not been consistently applied. Let us consider the Coleoptera. Our present catalogue of the Coleoptera of America north of Mexico by Leng, Mutchler, and Blackwelder includes all of the known beetles from Lower California, none from the mainland of Mexico! The same is true of its predecessor, the famous Henshaw catalogue. I believe this inconsistency arose from the fact that in 1861, LeConte wrote a paper on the Coleopterous fauna of Lower California, followed in 1873 with descriptions of many new species from this region. His interest in the fauna was followed by his distinguished successors, G. H. Horn, H. C. Fall, and C. Schaeffer (not to mention living Coleopterists). Yet in the entire works of these four men there is very little evidence of an interest in the mainland fauna of Mexico. This same situation is duplicated in certain other insect groups. Perhaps it arose from a tacit understanding with the editors of the Biologia Centrali-Americana that the Mexican mainland fauna was their special field. In any event, Lower California has long been considered the province of North American workers in the Coleoptera, Hymenoptera, Hemiptera, Diptera, etc., whereas the mainland fauna has had few U. S. students until very recent years.

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[1] Torre-Bueno, J. R. de la. 1942. Note on distribution of Heteroptera. Bull. Brooklyn Ent. Soc., 37: 183–185.

A second factor which has contributed to the evolution of our current practice has undoubtedly been *ignorance.* Undoubtedly, in the early days of systematic work, the significance of the Mexican fauna in relation to our own was not generally appreciated. In recent years, however, the bearing of the great Sonoran fauna on that of southwestern United States as well as the relation of the Neotropical to the Austro-Riparian, has been widely enough recognized, I believe, to be eliminated as a contributing factor in our general practice.

A third, and more serious factor, has been *lack of material.* Not only has it been difficult in the past to obtain adequate collections from Tamaulipas, Nuevo Leon, Coahuila, Chihuahua, and Sonora, etc., but the majority as well as the most critical types of most of the described Mexican insects are in Europe, a fact which has greatly handicapped American workers. Fortunately, collections are now more easily obtained and the former difficulty will soon be a matter of the past. The latter difficulty will eventually be overcome as the European types are studied and our own type collections gradually swing the balance in favor of the American worker.

Finally, a fourth, perhaps unsurmountable factor, has been the *practical difficulties* inherent in the problem itself. If we do not draw a line at the Mexican border, where shall we draw it? Shall we include northern Mexico, central Mexico, southern Mexico, Central America? Shall we base it on isotherms, rainfall, geographical configuration? The former methods would be equally arbitrary and artificial, the latter highly unsatisfactory in practical use as well as impossible in our present state of knowledge. To revert to the former, commonly suggested method, two examples will suffice to show that it would be no more satisfactory than our current methods. *Andrena,* a genus of bees, has something less than a thousand described species from the United States, less than fifty in Mexico, at least one (undescribed) in the higher mountains of Panama. Any boundary satisfactory for this genus should obviously include Panama. *Malacopterus tenellus* (Fab.), a common tropical American longicorn, is distributed southward into Argentina, northward into southern California, and possibly Arizona, Texas, Florida. A satisfactory boundary for this species which occurs in our fauna should include Argentina. In the final analysis, the only reasonable boundaries are those of the Western Hemisphere (papers with this scope are now appearing),[2] and even these break down slightly in the vicinity of Bering Straits. The difficulty is that within the political boundaries of the United States we have all of the American faunas represented from Arctic-Alpine to Neotropical. The faunas which are of northern origin (Arctic, Hudsonian, Canadian, Vancouveran, Alleghenian) are dominant within our boundaries (including according to current practice, Canada). The faunas of southern origin (Austro-Riparian, Sonoran, Neotropical) are represented by relatively small, northern extensions of greater faunas to the south. If we try to include these great southern faunas in our lists merely because they are represented within our boundaries, we will be in the position of trying to wag the dogs by their tails. Our problem would have been much simplified if the arid southwest and the Gulf states were a part of Mexico. However, our forefathers inconsiderately settled our national boundaries without regard for the problems of the systematic biologist!

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[2] Dillon, L. S. and Dillon, E. S. 1941. The tribe Monochamini in the western hemisphere. Reading Pub. Mus. & Art Gallery, Sci. Publ., 1: 1–135, pls. 1–5.

What, then, are the practical answers to these questions. With regard to *catalogues,* I see only one answer. For our own purposes these should be limited by the Mexican border since no better boundary is available. This treatment will satisfy the majority of the needs of the majority of United States entomologists. However, these catalogues should be supplemented by additional catalogues for Mexico, Central America, South America. We may have to prepare such catalogues ourselves, but whoever accepts this responsibility, such catalogues should and must be prepared. *Monographs and revisions,* however, should know no political boundaries. If they are being prepared from the standpoint of northern groups, they should reach out to include the peripheral forms "south of the border." If the groups concerned are of southern origin, they should be approached from that standpoint and not from the standpoint of the "tails" which extend within the political boundaries of the United States.

FIVE NEW WESTERN DOLICHOPODIDAE (DIPTERA).[1]

By F. C. Harmston and G. F. Knowlton,
Logan, Utah.

The following report deals with five apparently undescribed species of western Dolichopodidae.

Dolichopus utahensis n. sp.

Male: Length, 4.3 mm.; length of wing, 4 mm. Face golden pollinose, moderately wide, the sides nearly parallel. Front metallic green, dulled somewhat with brown pollen, especially along the orbits, where the ground color is barely discernible. Palpi yellow. Proboscis blackish. First antennal joint yellow; second and third joints black, the latter scarcely longer than wide, obtusely pointed at tip. Postocular cilia pale, about six of the upper cilia on each side are black. Dorsum of thorax metallic green, dulled with brownish pollen; pleura dulled with whitish pollen. Scutellum metallic green, with single pair of prominent marginal bristles, the posterior margin with delicate pale cilia. Abdomen metallic green with bronze reflections, its lateral and ventral portions whitish pollinose. Hypopygium blackish-green, dulled with white pollen; lamellae elongate-oval, white with narrow black border, jagged and bristly at tip.

Fore coxae yellow, the anterior surface with a scattering of pale and black hairs, the latter especially noticeable on inner portions; middle and hind coxae concolorous with pleura, their tips narrowly yellowish. Femora and tibiae yellow; middle and posterior pairs each with a single preapical bristle, the latter without cilia below, but possessing a row of delicate pale hairs, easily overlooked, on lower inner edge. Middle tibiae relatively long, with a conspicuous, elongate opalescent spot at tip on the outer surface; posterior tibiae with a silvery pollinose stripe when viewed from behind. Fore tarsi black from tip of first joint; middle and hind tarsi entirely black. Joints of fore tarsi as 16–8–6–4–4; of middle tarsi as 18–10–7–4–4; of hind tarsi as 20–18–11–7–5. Calypters and halteres yellow, the former with black cilia.

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[1] Contribution from the Department of Entomology, Utah Agricultural Experiment Station.

Wings grayish hyaline, tinged with brown along anterior margin; fourth vein bent before the middle; costa somewhat thickened at tip of first vein, but without a definite knot-like, or elongated, swelling; anal angle rounded, prominent.

Female: Like male in general coloration; the face is broader, its pollen of a silvery-brownish hue; middle tibiae without the opalescent spot at tip, which is so conspicuous in the male; middle tarsi are yellowish at base.

Described from holotype male and allotype female, both taken at Park City, Utah, July 11, 1941, by G. F. Knowlton and F. C. Harmston. Types to be deposited in the U. S. National Museum.

Taxonomy: Three species of *Dolichopus* are known from North America which are alike in possessing a smooth, opalescent area at the tip of middle tibiae. Two of the species, *fulvipes* Loew and *inflatus* Aldrich, have the middle basitarsi yellow at base; the third species, **utahensis** n. sp., has middle tarsi wholly black. The last two antennal joints are black in *inflatus* and *utahensis,* whereas in *fulvipes* the corresponding parts are yellow. The hind tarsi are wholly black in *fulvipes* and *utahensis,* yellow at base in the case of *inflatus.* The type locality of *fulvipes* is Illinois; it is recorded also as occurring in Maine, New York, New Hampshire and Ontario; *inflatus* was described from a male taken in Alaska.

Dolichopus aboriginis n. sp.

Male: Length, 4.4 mm.; length of wing, 4 mm. Face moderately wide, the sides nearly parallel, silvery pollinose. Front shining, metallic violet, with bluish reflections, narrowly yellowish pollinose along orbits. Antennae black; first joint brownish-red on lower half; third joint scarcely longer than broad, obtusely pointed; arista slightly pubescent. Proboscis black. Palpi yellowish-brown with minute pale cilia on anterior surfaces and a short, prominent black bristle at tip. Postocular cilia white, about six of the uppermost cilia on each side are black.

Dorsum of thorax bronze-green, dulled with yellow pollen, the median and lateral portions more brownish. Scutellum with a single pair of prominent marginal bristles, its posterior margin fringed with delicate pale cilia. Abdomen metallic green with bronze reflections, lightly whitish pollinose on lateral portions. Hypopygium blackish, its lamellae of moderate size, elongate-oval, whitish with narrow black border, jagged and bristly at tip.

Fore and hind coxae yellow, the latter in some specimens tending toward a brownish hue. Fore coxae with delicate pale hairs on anterior surface and a few prominent black bristles at tip; middle and hind pairs each with a single preapical bristle, the latter with pale cilia on lower, inner edge which are minute on basal half, but fully as long as the width of femora on the apical half of femora. Tibiae yellow, the posterior pair brownish and slightly incrassated, on apical one-fifth. Fore and middle tarsi blackish from the tip of first joint; middle basitarsus with a prominent, short bristle on upper surface; posterior tarsi wholly black. Joints of fore tarsi as 20–10–9–5–4; of middle tarsi as 27–13–10–6–4; of hind tarsi as 25–20–12–7–5. Calypters and halteres yellow, the former with black cilia. Wings large, broadest opposite the cross-vein; fourth vein with an abrupt bend near basal third, from which point it runs nearly parallel with the third vein; costa with a prominent, elongate-oval thickening at tip of first vein; wings narrowed toward the base, the anal angle not at all prominent.

Female: Like the male in nearly all respects; the face is broader; front more greenish, without violet reflections; third antennal joint shorter, less pointed.

Described from 5 males and 1 female. Holotype male, allotype female and two paratype males taken at Mountain Home, Utah, July 21, 1939; two paratype males taken on Mt. Timpanogos, Utah, July 5, 1941, all collections by G. F. Knowlton and F. C. Harmston. Holotype and allotype to be deposited in the U. S. National Museum; paratypes in the insect collections of the California Academy of Sciences and the Utah Agricultural Experiment Station.

Taxonomy: **Dolichopus aboriginis** n. sp. would trace to *D. flavicoxa* Aldrich, or possibly to *D. brevipilosus* Van Duzee, in the Van Duzee and Curran key, American Museum Novitates No. 683, 1934. The elongate thickening of the costa at tip of first vein readily distinguishes **aboriginis** n. sp. from these two species, both of which have a small, knot-like, thickened area. In addition, the fore coxae of *brevipilosus* are blackened at base on the outer surface; in *flavicoxa* the middle femora possess two preapical bristles.

Hercostomus wasatchensis n. sp.

Male: Length, 3.3 mm.; length of wing, 3 mm. Face silvery pollinose, considerably narrowed below. Front broad, concolorous with face. Palpi and proboscis yellowish-brown, bearing small black hairs. Antennae entirely black; third joint slightly longer than broad, pointed, evenly rounded below; arista scarcely pubescent, evenly tapering to a sharp point. Postocular cilia white, about five of the uppermost cilia on each side are black.

Dorsum of thorax and the pleura heavily dusted with white pollen, which nearly hides the greenish-bronze ground color. Dorsal and lateral portions of metallic green; the ventral portion thickly dusted with white pollen. Hypopygium large and broad, subsessile, greenish-black. Hypopygial lamellae yellow, consisting of two linear processes, one much longer than the other, both fringed with prominent black bristles.

Fore coxae yellow, blackened on outer basal portion; anterior surfaces with small, scattered black hairs and prominent black bristles at tip. Middle and hind coxae concolorous with pleura, their tips narrowly yellowish. Femora yellow, the posterior pair broadly blackened at tip. Tibiae yellow, the posterior pair blackened and slightly thickened on apical one-third. Fore and middle tarsi black from tip of first joint; the first and second joints of middle tarsi bear a row of conspicuous, yet delicate, cilia on the plantar surface, these cilia being a continuation of the cilia which arise on the apical one-fourth of middle tibiae. The middle tibiae in **wasatchensis** n. sp. are practically identical in structure with the corresponding tibiae of *H. cryptus* H. & K., the latter being shown in figure 6, page 128 of the Canadian Entomologist, Vol. 73, July 1941. Joints of fore tarsi as 8–4–3–3–4; of middle tarsi as 15–9–5–4–4; of posterior tarsi as 10–14–8–5–5. Calypters and halteres yellow, the former with black cilia.

Wings grayish hyaline, darkened along anterior margin from a point slightly beyond the posterior cross-vein: veins black; costa thickened at tip of first vein, from which point it tapers rapidly toward tip of second vein. The wings of *wasatchensis* are very similar to those of *H. neocryptus* H. & K. The drawing of the wing of the latter species, figure 15, page 128, the Canadian Entomologist, July 1941, also well illustrates the wing of **wasatchensis** n. sp.

Female: Like the male in most respects. Lacks the peculiar chaetation of middle tarsi; costa is not thickened; both posterior femora and the wings lack the black spot at apices.

Described from holotype male, allotype female and one paratype male, all taken July 6, 1941, on Mt. Timpanogos, Utah, by F. C. and V. H. Harmston. Holotype and allotype deposited in the U. S. National Museum; paratype in the senior author's collection.

Taxonomy: The ciliation of the first two joints of middle tarsi, together with the yellow femora, readily distinguish this species from other known American species of *Hercostomus.*

Polymedon californicus n. sp.

Male: Length, 4.4 mm.; length of wing, 4.2 mm. Face bright, silvery pollinose, spatula-shaped, narrowed in the middle, broadest opposite the lower margin of eyes, extending below the lower corner of eyes a distance equal to its greatest width. Front silvery pollinose, the bluish-green ground color discernible near the middle. First two antennal joints yellow, blackened on extreme upper edges; third joint black, slightly longer than broad, obtusely pointed; arista thick at base, tapering rapidly, without evident pubescence. Palpi and proboscis black. Postocular cilia white, about eight of the upper bristles and two near the proboscis on each side are black.

Dorsum of thorax and abdomen shining metallic green; pleura and lateral portions of abdomen lightly silvery pollinose. Bristles of thorax strong, black; scutellar bristles consisting of a pair of large, prominent bristles, lateral to which is a pair of small, hair-like setae. Hypopygium pedunculate, black, lightly dusted with white pollen; lamellae of moderate size, somewhat triangular, yet rounded on apical portion, the stem yellowish, shading to black beyond the middle, fringed along edges with black bristles.

Fore coxae yellow, tinged with green on outer, basal portions, the anterior surfaces with black hairs and bristles; middle and hind coxae black, yellow on apical third. Femora and tibiae yellow, the middle and hind femora each with a single preapical bristle; bristles of middle and posterior tibiae prominent. Fore and middle tarsi black from the tip of first joint; second to fourth joints of fore tarsi noticeably flattened; middle tarsi with conspicuous bend between the second and third joints, a condition similar to that occurring in the males of several species of the genus; posterior tarsi black, the first joint more brownish at base. Joints of fore tarsi as 14–5–4–3–4; of middle tarsi as 18–6–5–5–4; of posterior tarsi as 15–19–11–6–5; calypters and halteres pale yellow, the former brownish at apex, bearing long, black cilia.

Wings grayish hyaline, tinged with brown along veins and anterior margin; costa almost imperceptibly thickened before the tip of the first vein; anal angle prominent, rounded.

Described from one male, taken at Sonora, California, September

8, 1941, by F. C. and V. H. Harmston. Type to be deposited in the California Academy of Sciences insect collection.

Taxonomy: **Polymedon californicus** n. sp. is readily distinguishable from *P. nimius* Aldrich, in lacking the greatly thickened costal vein, so prominent in the latter species. It differs from *P. triangularis* Aldrich in the color and structure of the hypopygial lamellae. The lamellae of *californicus* n. sp. are yellow at base, shading into black from a point slightly beyond the middle, and are triangular with rounded apical portion. In *triangularis* the lamellae are yellow, the black distal border appearing squarely cut-off.

Medeterus idahoensis n. sp.

Male: Length, 1.6 mm. Face black, its sides nearly parallel. Front black, lightly dusted with white pollen. Antennae black; third joint small, rounded; arista apical. Postocular cilia pale.

Dorsum of thorax, scutellum and abdomen black, lightly dusted with white pollen. Bristles above fore coxae pale, the remaining thoracic bristles blackish. Hypopygium black, relatively large, pedunculated; inner lamellae yellow; outer lamellae consist of a pair of black, needle-like structures.

Coxae, femora and tibiae black, of usual form. Tarsi black at base, shading into yellow at the apices. First joint of posterior tarsi plain, slightly shorter than the succeeding joint. Calypters and halteres blackish, the former with pale cilia.

Wings grayish hyaline; veins black; fifth vein greatly broadened from a point near the basal third, this thickened area being about the same length as the remaining portion of the fifth vein; cross-vein one-third the length of last portion of fifth vein; anal angle prominent, evenly rounded. Described from one male, taken at Sandpoint, Idaho, September 28, 1941, by F. C. and V. H. Harmston. The specimen was collected from near the base of a coniferous tree. Unfortunately the type specimen was somewhat damaged after the description was made. Type to be deposited in the California Academy of Sciences insect collection.

Taxonomy: **Medeterus idahoensis** n. sp. is the third member of the genus known to occur in North America possessing a greatly incrassated fifth vein. It, like *M. crassivenis* Curran, described from New York, has black femora and tibiae. The two species are readily separated by the difference in the comparative length of the cross-vein and the last section of the fifth vein. In *crassivenis* the last section of fifth vein is hardly one-half the length of cross-vein, whereas in *idahoensis* the cross-vein is only about one-third the length of the last section of fifth vein. The third species, *M. alpinus* H. & K., has a fifth vein greatly broadened; it is readily distinguished by the yellow femora and tibiae. *M. alpinus* was described from California.

ON TOM SPALDING.

(Extract from Utah, A Guide to the State, pages 416–17; published by Hastings House, N. Y., and copyright by Utah State Institute of Fine Arts.—By permission.)

"Little Billie King, a roving printer . . . wandered into town (Eureka, Utah) in 1899. He soon became known as the 'Belfast Spider' because of his tales of championship prize fights he had won. For years he lived in a plank cottage at the head of Church Street, and built fires only when he cooked. In summer, it was Billie's custom to hie himself to a nice sunny hillside and sleep off his latest jag, thus combining a steam bath and a good long rest. Awakening one morning from his nap, still groggy, he spotted a man running around the hill with a fish net, apparently trying to pull a fish out of the air. Billie walked over to him, placed his hand on his shoulder, and said, 'You'd better come to town with me, friend.' The stranger explained that he was searching for bugs. Billie smiled indulgently and said, 'Sure, I know. I've had 'em myself, but you better come to town with me.' The stranger, convinced by this time that Billie was crazy, decided he had better humor him, and allowed himself to be led to town. Later Billie discovered that his 'crazy man' was Tom Spalding, the man who put Utah on the Entomological map. Spalding, a natural-born collector, sold one collection for $1,400, and another is included in the $3,000,000 Barnes collection at Decatur, Illinois. (Now in the U. S. Nat. Mus. at Wash.) Spalding first came to the notice of entomologists in 1910, when he captured a little blue butterfly, the first of its kind ever found; it was named *Philotes spaldingi.* Twelve other unusual specimens were named for Spalding. He died in Salt Lake City in 1929."

NOTE—Matter in ( ) not in original.

Synonyms of *Ataenius spretulus* (Hald.).—*Ataenius spretulus* described by S. S. Haldeman as an *Aphodius* (Journal Academy Science Philadelphia 2nd Series, Vol. 1, 1848, p. 106) has been considered a synonym of *Ataenius strigatus* (Say) and was so designated in the Leng Catalogue. Examination of Haldeman's type, now with the *strigatus* series in the LeConte collection at the Museum of Comparative Zoology at Harvard, shows that *spretulus* differs from *strigatus* and is the same species later described by H. C. Fall under the preoccupied name *consors* (Journal of New York Ent. Soc., Vol. XXXVIII, 1930, p. 104), and renamed *falli* by H. E. Hinton (Canadian Entomologist, Vol. LXVI, 1934, p. 119). *Ataenius spretulus* (Hald.) should be restored to our lists, with *consors* Fall and *falli* Hinton as synonyms.—O. L. Cartwright, S. C. Exp. Sta., Clemson, South Carolina.

Nabis roseipennis Feeding Records.—Two specimens of *Nabis roseipennis* Reut. were found to be feeding on wingless aphids, *Macrosiphum albifrons* Essig, on a blue-flowered *Lupinus* sp. on the east slope, near the summit of Beaver Mountain, Utah, just below the Great Flats, on July 10, 1942. Next day a *N. roseipennis* male was observed feeding on a small aphid, *Calaphis coloradensis* Granov., in the foothills of Beaver Mountain; while feeding the predator was standing on the edge of a leaf of *Betula fontinalis.* A female *N. roseipennis* was found to be feeding on an apterous *Mucrotrichaphis toti* K.-A. among a colony of this aphid at "The Pines Camp Ground" at the south of Mount Nebo, Juab County, Utah, July 12, 1942. One of two *N. roseipennis* observed nearby on yellow pine was feeding on an aphid, *Schizolachnus piniradiatae* (Dav.). The writer was on field work with Mr. W. E. Peay on July 30, 1942, making sweepings with an insect net in the meadows between Genola and Mosida, in Utah County, Utah. Examination of the net contents disclosed a large catch of several species of grasshoppers. In addition, the bottom of the net held other insects including 5 big-eyed flies, Doralidae (= Pipunculidae) and 2 damsel bugs of this species. One of these damsel bugs was feeding upon, and when disturbed walked away dragging a specimen of *Tomosvargella utahensis* (Hdy.-Knlt.) det. Capt. D. E. Hardy. When chased into a cyanide vial while still dragging and feeding upon its prey, the *N. roseipennis* held its victim tenaciously until nearly overcome by the poisonous gas; then the fly was released.—George F. Knowlton, Utah Agricultural Experiment Station, Logan.

BOOK NOTES.

General Biology, by Tracy I. Storer. Pp. i–xii plus 1–798, 551 figures, numbered serially from 1 up for each chapter. (McGraw-Hill Book Co., New York. $3.75.)

This book is one of the fine contributions to the literature of the biological sciences these publishers are making.

As the comment on the jacket says: "The author has made a special effort to treat animals as they live in nature rather than as dead specimens in the laboratory." This remark is a highway sign leading away from a biology tied to the procrustean bed of a theory of nature. After all, biology is, or should be, the knowledge of living things alive and in their natural surroundings and activities. In its very nature, this knowledge can never be as precise and as exact as mathematical science, since life is protean, ever-changing, and its manifestations beyond counting. I believe that no one man can ever attain to entire and complete knowledge of any living group, however small and restricted it may be. To fancy such a case possible is evidence of an imagination uncontrolled by facts.

Part I of General Biology takes up in 11 chapters the subject of General Animal Biology; part II in 22 chapters, discusses the Animal Kingdom, Phylum by Phylum, the last 9 chapters being devoted to the Phylum Chordata, class by class, the last dedicated to mankind. Each chapter has a selected list of references. There is also a Glossary of 16 pages, and an Index in 40 pages.

Very naturally, the chapter on Insects is extremely brief. You cannot adequately treat 660,000 species in so little as 52 pages. The list of references to this chapter might also have been more extensive and inclusive. We miss our old standard Comstock's Manual, among others. They range from Lutz's Field Book of Insects, to Snodgrass's Principles of Insect Morphology, that is, from the frankly popular to the highly technical. Of course, such a list is highly selective, and reflects the author's personal evaluation and interest.

The above, after all, is in the nature of picking flaws, but all perfection consists in the elimination of flaws. Notwithstanding, this is an excellent work, and will be found most useful by those for whom it is intended.

J. R. T-B.

PROCEEDINGS OF THE SOCIETY.

Meeting of January 14, 1943.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on January 14, 1943. The meeting was called to order at 8:00 P.M. by President, Wm. T. Davis.

Members present were: Mr. Edwin Way Teale, R. R. McElvare, Otto Buchholz, Wm. T. Davis and A. T. Gaul. Visitors included Mr. E. G. Jewett, Dr. Noel Hynes and Dr. Charles Michener.

Minutes of the preceding meeting were read and approved. The annual reports of the treasurer and of the publication committee were favorably received.

Mr. Buchholz, chairman of the nominating committee, nominated for President—Mr. Wm. T. Davis; for Vice-President and Treasurer—Mr. R. R. McElvare; for Secretary—Mr. A. T. Gaul; Publication Committee—Mr. J. R. de la Torre-Bueno, Editor, and Edwin Way Teale and A. T. Gaul; Executive Committee—Wm. T. Davis, R. R. McElvare, Edwin Way Teale, F. T. Naumann, Otto Buchholz and A. T. Gaul. Nominees were unanimously accepted pending approval a quorum of the Society.

A regular program committee was appointed consisting of Wm. T. Davis, Edwin Way Teale and A. T. Gaul.

Dr. Michener, speaker of the evening, presented a discussion on "Observations on a Colony of Harvester Ants" which is published elsewhere.

The meeting was adjourned at 9:30 P.M.

Respectfully submitted,

Albro T. Gaul,
Secretary.

Earwig in South Dakota.—A single specimen of the earwig, *Labis minor* Linn., was taken on July 29, 1942 in a light trap operated on an Indian reservation at Fort Thompson, South Dakota. The only other specimen of this earwig that is found in our college collections is one labelled South Dakota with no other data recorded. The writer has operated light traps for many years in many different localities in South Dakota, but in no other instance have we ever taken representatives of this or any other species of earwig in the state. Further in spite of an immense amount of collecting at electrically lighted windows, street lamps, etc., we have not taken a single specimen of earwig in such locations.—H. C. Severin, South Dakota State College, Brookings, S. D.

Insects

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OF THE
BROOKLYN ENTOMOLOGICAL SOCIETY

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The Brooklyn Entomological Society

Meetings are held on the second Thursday after the first Tuesday of each month from October to June, inclusive, at the Central Museum, Eastern Parkway and Washington Ave., Brooklyn. The annual dues are $2.00.

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BULLETIN

OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

Vol. XXXVIII October, 1943 No. 4

NOTES ON RHABDOPTERUS IN THE UNITED STATES (COLEOPTERA, CHRYSOMELIDAE).

By H. S. Barber, Washington, D. C.

Records of injury to cultivated plants in the eastern half of the United States by subspherical, brownish, or blackish-bronzed, shining eumolpine leaf beetles have been made under the name *Rhabdopterus picipes* but appear to include several natural species which have been confused as one. These apparently distinct species are very similar and their proper classification has been prevented by the poor and scanty samples which have been accumulated and by a false assumption that our fauna is well known. The notes here offered result from a tedious study of some 400 specimens assembled in the National Collection representing many localities from Prince Edward Island and Alberta to the Everglades and the Rio Grande. These specimens are, for the most part, very unsatisfactory for study, being discolored, decayed, and broken or distorted, owing to the very crude, old-standard procedure of allowing the beetles to dry slowly. Many of them are immature and soft, suggesting that they mature and harden slowly while feeding on the leaves of their host plant, and in such immature male samples the aedeagus has become shriveled and distorted in drying. In great contrast to these are a few samples collected and received in alcohol which have yielded excellent preparations of the aedeagus of even the softest teneral males while the mature and fully hardened individuals have made very superior specimens with no discoloration or visceral decay. New alcoholic samples from any brood of these beetles throughout their wide habitat are earnestly solicited to supplement or replace the unsatisfactory samples. Numerous lots consist only of female beetles, but about 130 males have been dissected to display the form of the apex of the aedeagus. Such dissection is now, in the writer's opinion, almost a routine duty, but is tedious, slow, and

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discouraging with old specimens in contrast to the satisfaction to be obtained from well-preserved alcoholic samples. The differences in the male genitalia thus displayed appear to indicate units of population which we must recognize as species and which extend over wide areas. The results obtained, therefore, are quite different from those hitherto obtained from the study of external characters, but our area is still very poorly sampled.

The note by Jones 1941 (Jour. Econ. Ent., 34: 321) includes the views then held by the present writer, but no males were among the four dried, distorted, and broken specimens which were unfortunately then misidentified as *Rhabdopterus praetextus* (Say). Other dried samples received later from the same locality contained immature males which, when dissected, disclosed the shriveled and distorted genitalic form unlike that previously known in *Rhabdopterus* but resembling that in certain Sonoran species of *Colaspis.* Additional males of this new form were then recognized by dissection of old samples dating back to Hoffman in Iowa, 1872, Schwarz at Detroit, about 1874, and Riley in Missouri and Belfrage in Texas before 1880. In the record by Jones 1941 the name *Rhabdopterus praetextus* as applied by myself to the beetles attacking grape in Missouri now requires correction to read *R. deceptor,* which is described below as new, and the cranberry rootworm in New Jersey may prove to be *R. picipes* instead of *R. praetextus* if good samples become available. Taxonomists who have discussed these beetles have confused species and misapplied names in their discussion. Hubbard and Schwarz 1878 (Amer. Phil. Soc. Proc., 17: 660) record *Colaspis praetexta* Say from Detroit, but their specimens now before me are *deceptor.* Hamilton 1890 (Canad. Ent., 22: 240), using the combination *Tymnes chrysis,* seems to have misidentified *Tymnes tricolor* (F.) as *Colaspis chrysis* Oliv., which had not then been rediscovered, and was further confused by conflicts in the descriptions, so that the ideas he expresses under the names *picipes* and *praetextus* are not clear. Horn 1892 did not recognize *picipes* correctly but seems to have applied that name to samples of *praetextus,* which name he suppressed as a synonym of *picipes,* and Bowditch 1921 appears to have redescribed *picipes* under the new name *blatchleyi,* being misled by Horn's statements.

Geographically our species seem to occupy areas as follows: Coastal lowlands from the Mississippi to Rhode Island, *picipes;* southern Florida, *bowditchi;* inland region, Quebec to Rio Grande reaching Philadelphia, Washington, D. C., and Florida, *praetextus;* inland region, Alberta to Texas and New York, *deceptor;* New

Hampshire and Massachusetts, *spiculatus;* Brownsville, Tex., *weisei.*

The generic distinction between *Colaspis* Fabricius 1801 and *Rhabdopterus* Lefevre 1885, the prosternum narrow in the one and broad in the other, is not useful. The genotype of *Rhabdopterus* must be one of the four Colombian species originally placed under the preoccupied generic name *Rhabdophorus* Lefevre 1878, but of these only the female of *caliginosus* is now available, and it seems doubtful is *picipes* is very closely related to that species. A very close relationship is evident, however, among several of our species, including *picipes,* in which the shape of the apex of the aedeagus differs greatly from that in any species of *Colaspis* observed by the writer, whereas in another species, *deceptor,* externally similar to these, the form of the aedeagus is very different. An aedeagal shape very similar to that of the latter is found, however, in the type specimen of *Colaspis viriditinctus* Schaeffer 1920 from Douglas, Ariz., which species is now represented by samples from Phoenix, Tempe, and Nogales, Ariz., and which is not a variety of *C. brunnea* as originally believed.

The genotype of *Colaspis* is *Chrysomela flavicornis* F. 1787, the type locality of which is Cayenne. Several species from this region agree with the vague original description, and the literature on this species does not allow the writer to determine which of the species is *flavicornis,* nor whether this name is correctly suppressed as a synonym of *occidentalis* L. 1758, the type of which had been collected by Rolander, probably at Surinam. In one of these species the aedeagus is shining brown and rather strongly sclerotized below in the median third of its length, while in another the concave under surface is conspicuously white and membranous in the same area in strong contrast to the very heavily sclerotized sides, apex, and base. Specific modifications of this nature occur in North American species of *Colaspis,* but until they can be elucidated, or until *Rhabdopterus* can be recombined with *Colaspis* on other grounds, our forms may remain under the familiar generic name *Rhabdopterus* Lefevre 1885. Forty American species have been cataloged by Clavareau 1914 (in Junk, Coleopt. Cat., pt. 59, p. 38), only one of which, *picipes,* with *praetexta* in synonymy, was recognized as from north of Mexico. Ten more species were described by Bowditch 1921 (The Entomologist, 54: 216, 234–236, 253–255), one of which, *blatchleyi,* may be *picipes.* In our samples from north of Mexico six species are indicated by the forms of the aedeagal apices as shown in figure 1. Characters for identification of the females

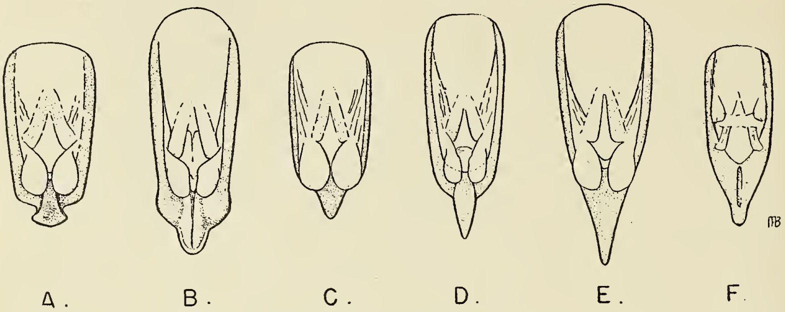

FIG. 1. Aedeagi of: A, *Rhabdopterus picipes* (Oliv.); B, *R. bowditchi* Barber, type; C, *R. praetextus* (Say); D, *R. spiculatus* Barber, type; E, *R. deceptor* Barber, type; F, *R. weisei* (Schaeffer), type (part of armature of internal sac extruded). (Drawings by Mary F. Benson.)

have not been found, but such specimens should be identifiable if kept with the males in lots of which they are a part. Females unassociated with males are left unidentified. The males of six species now known in the United States are distinguished as follows:

KEY TO SPECIES OF RHABDOPTERUS NORTH OF MEXICO

1. Aedeagus nearly oblong, quadrate in orificial aspect, its sides only slightly convergent, its apex abruptly, sinuately truncate but with a short, median, dentiform process (fig. 1, A to D) 2

Aedeagus more tapering in orificial aspect (except in *weisei*), its apex not sinuately truncate but produced into an acuminate, somewhat flattened process (fig. 1, E, F) 5

2 (1). Aedeagus with apical margin longer and very heavily sclerotized, the dentiform process short, broad, and strongly convex or carinate above, the convexity extending basally as a ridge to the membranous orifice and separated on each side from the conspicuously convex lateral areas by a strong sulcus; legs brown ... 3

Aedeagus with apical sclerotized margin narrow, the dentiform process rounded or tapering towards tip; antennae and legs whitish, male hind tibiae with lower carina obsolescent 4

3 (2). Body more robust, the metallic reflections faint bronzed or greenish; hind tibia of male strongly carinate and

dilated inwardly in apical third; dentiform process of aedeagus rather broad and usually strongly constricted at base, its apex subtruncate, with dorsal carina flattened (fig. 1, A, *picipes* s. str.), or broader, less constricted, and with carina narrow (var. ? *blatchleyi* Bowd.) .... *R. picipes* (Oliv.)

Body more elongate-oval, the metallic reflections often strong; hind tibia of male narrower, with inner carina only slightly developed at apical third and feebly emarginate in apical third; dentiform process of aedeagus narrow, parallel-sided, rounded, with strong, acute dorsal carina (fig. 1, B). Subtropical Florida. **R. bowditchi** n. sp.

4 (2). Apical tooth of aedeagus short, rounded (fig. 1, C). Quebec to Brownsville, Tex. ... *R. praetextus* (Say)

Apical tooth of aedeagus long, acuminate, and bent upward (fig. 1, D). Massachusetts, New Hampshire and Maine .... **R. spiculatus** n. sp.

5 (1). Larger (5–6 mm.), dark brown or blackish, often with strong greenish reflections especially at margins; dorsal sculpture coarse; legs and antennae pale, the hind tibia of male with inner margin concave but carinate and feebly produced near apex; aedeagus strongly tapering in orificial aspect, its apex narrowly produced and acuminate (fig. 1, E), its lower surface membranous. Iowa; Alberta to New York and Texas. **R. deceptor** n. sp.

Smaller (4½ mm.), brown, without greenish luster; dorsal punctures larger, deeper, and more remote, with the interstices more convex; legs brown, comparatively short and stout, the tibial apices more enlarged, the hind tibia (male) neither arcuate nor carinate on inner surface and the basal tarsal joints only feebly enlarged; aedeagus sclerotized beneath and less tapered, broad and ogival behind the orifice, the apex slightly produced, curved upward and rounded (male holotype). Brownsville, Tex. .... *R. weisei* (Schaeffer)

Rhabdopterus picipes (Oliv.).

Colaspis picipes Oliv. 1808, Entomologie, 6: 886.

Chalcophana picipes (Oliv.) Chevrolat 1837, Dejean Cat. revised, p. 432.

Rhabdopterus picipes (Oliv.) Lefevre 1885, Mem. Soc. Liège, (2) 9: 47.

? *Rhabdopterus blatchleyi* Bowditch 1921, The Entomologist, 54: 216, 234.

This species was described from a sample collected in Carolina by Bosc, who had spent 2 years about 1798 at or near Charleston. Samples from this locality are not now available. Northern and western forms in which the legs and antennae are almost white in life have long been misidentified as *picipes* following Horn 1892 (Amer. Ent. Soc. Trans., 19: 226). Horn seems to have misled Bowditch into his proposal of the name *blatchleyi* for a specimen from Charleston and others, including the undesignated type, from Florida. Southern specimens are usually larger, darker, and rather strongly metallic in contrast to the somewhat smaller, feebly metallic brown specimens from the Chesapeake region. Under the name *picipes* are recorded observations on a pest of cranberry in New Jersey and of blueberry in North Carolina, and although suitable samples representing these reports are not available the name is probably correctly applied.

The variational and geographical limits of this species cannot be defined from the inadequate, fortuitously assembled samples now available, but it appears that *picipes* occupies the coastal lowlands from the Mississippi Delta to Rhode Island and is in contact along the inland margin of its area with the pale-legged, smaller species *praetextus* (Say), both species being found at Philadelphia and Washington, and in the South.

The five male and five female types of *blatchleyi*, which Bowditch 1921 suspected might be the form originally described as *picipes*, have not been restudied. They were collected at Dunedin, Fla., by Dr. Blatchley, the date being not recorded. Another male from this type locality and collector is dated July 5, 1915, and is believed to represent this form, but it differs from typical *picipes* only in the broad, very slightly constricted and narrowly carinate apex of the aedeagus. A similar male was collected at Tampa, April 12, 1876, by E. A. Schwarz, who listed it (Amer. Phil. Soc. Proc., 17: 457, 1878) as "*Colaspis praetexta* Say, not rare," applying this name to the several forms herein distinguished in the material from Florida. Another specimen of this form from Dr. Blatchley is labeled Royal Palm Park, April 6, 1925, but still other males from this place differ in the modification of the hind tibiae and seem to represent a distinct species (*bowditchi*). About 80 specimens before me are believed to be *picipes*, 25 of them by the form of the displayed aedeagus.

Rhabdopterus bowditchi n. sp.

This form seems to be the one discussed without a name by Bowditch 1921 (The Entomologist, 54: 235), but his specimens from Blatchley have not been seen. The slight carina at the apical third of the hind tibia of the male continues to the apex but is so reduced that the inner margin is concave or emarginate in the apical third of its length. The aedeagus somewhat resembles that in *blatchleyi,* but the apical lobe is narrow, not constricted, and rounded at the apex (fig. 1, B). Eight males are from the following five localities: Paradise Key (Royal Palm Park), type, collected by the writer, March 10, 1919; Biscayne, May 1887, E. A. Schwarz; Haulover (10 miles north of Titusville), March 1875, E. A. Schwarz; Glades County, February 1930; and Martin County, March 1930. With these are associated 15 females from the same region, one of them having been submitted as injurious to avocado. Their metallic luster ranges from green to purple.

Type and seven paratypes, United States National Museum, Catalog No. 26439.

Rhabdopterus praetextus (Say).

Colaspis praetexta Say 1824, Acad. Nat. Sci. Phila. Proc., 3: 442.

Rhabdopterus picipes auct. (not Oliv.).

Rhabdopterus praetexta (Say) Barber, in Jones 1941, Jour. Econ. Ent., 34: 321 (part).

The whitish antennae and palpi, pale legs, and rather small size indicated in the original description apply better to the smaller and more widely dispersed of our confused forms. The statement by LeConte 1859 (Complete Writings of Thomas Say, vol. 2, p. 211) that *praetexta* was *picipes* Oliv. appears to be the reason this species has remained unknown. The grape pest in Missouri, which the present writer misidentified from female specimens as *praetexta* and which was recorded under this name by Jones 1941 (Jour. Econ. Ent., 34: 321), is not this species but is described below as *R. deceptor.* A male from Philadelphia, June 22, 1899, Geo. Greene, agrees with the original description and is selected as neotype to replace the lost type of *praetextus.* It agrees also in habitus, in the color of the appendages, and in the shape of the aedeagus with numerous males representing about 35 localities from Montreal to Florida, Lawrence, Kans., and Brownsville, Tex.

About 160 specimens, including 50 dissected males, have been examined. An old sample in the Knab collection seems to represent a variety, perhaps peculiar to Prince Edward Island, in which the apex of the aedeagus is longer and more tapering but is not as in *Rhabdopterus spiculatus.* This sample was identified as *R. picipes* by someone who sent the 7 specimens bearing the printed labels, Joliette PEI, 7–9–00, to the late Frederick Knab.

Rhabdopterus spiculatus n. sp.

The produced, elevated, spinelike apex of the aedeagus (fig. 1, D) cannot now be regarded as a mere variation, and it is hoped that better samples of this form will be obtained. The few specimens resemble *praetextus* except in this genital character and fall within the size variation in that species, from which they seem to be indistinguishable by superficial characters.

A male (type) and two females collected August 5, 1902, along the Notch Road, South Amherst, Mass., by the late F. Knab, a male and female labeled Belknap County, N. H., from the collection of W. S. Abbott, and a male collected on Big Diamond Id., Portland, Maine, July 9, 1918, by C. A. Frost.

Type and five paratypes, United States National Museum, Catalog No. 56440.

Rhabdopterus deceptor n. sp.

Rhabdopterus praetexta (Say) Jones 1941, Jour. Econ. Ent., 37: 321 (Barber ident. err.).

Colaspis praetexta Say, Hubbard and Schwarz 1878, Amer. Phil. Soc. Proc., 17: 660.

Elongate oval, convex, shining, strongly punctate, piceous to black with aeneous luster above, the reflexed margins greenish, the legs and antennae pale yellow to whitish, the underside brown to piceous. Length 5–6 mm., width 2.6–3 mm.

The habitus is very similar to that of *picipes,* the legs and antennae paler yellow, the hind tibia of the male with inner margin similarly but less strongly carinately lobed before apex. The aedeagus, however, of very different form, the sides converging from about basal fourth to the attenuate apex, with only a very slight sinuation below the orifice. No satisfactory characters by which the females of *deceptor* can be distinguished from those of *praetexta* have been found, although more than 40 bear the same source labels as the male paratypes listed below. Several localities are represented by old specimens which have been "identified" as *praetexta* or as *picipes.* The selected type is a well-matured male received in alcohol from Carl J. Drake with the statement that the species was very abundant and doing great damage to corn near Spencer, Iowa, June 18, 1941. Eight well-matured females received with this male type are nearly black above but with strong greenish reflections. The paratypes found injuring grape at Marshall, Mo., in June 1940, and June 16, 1941, are mostly immature and not well preserved.

Type and 45 male paratypes, United States National Museum, Catalog No. 56441.

Their labels supply the following distributional data: Waghorn, Alberta, July 1902, P. B. Gregson, from Knab Collection—1 ♂, 1 ♀; Winnipeg, Manitoba, from Wickham Collection—1 ♂, 1 ♀; Montana (probably Morrison Collection)—1 ♂; Volga, S. Dak., Truman, from Wickham Collection—1 ♂; Kenoche, Nebr., from Wickham Collection—1 ♂; Iowa, Hoffman, 1872, from Riley Collection—2 ♂, 3 ♀; Iowa City, Iowa, July 1921, Wickham—2 ♂, 4 ♀; Lake Okoboji, Iowa, June 1916, Buchanan—2 ♂, 4 ♀; Spencer, Iowa, June 18, 1941, injuring corn, C. J. Drake (type)—1 ♂, 8 ♀; Onaga, Kans., June 4, 1901, Crevecoeur, from Knab Collection—1 ♂, 3 ♀; Topeka, Kans., Popenoe—2 ♂, 3 ♀; Balwin, Kans., June 2, 1906, J. C. Bridwell, from Moznette Collection—1 ♂; Kansas, Collection Ashton—3 ♂; Marshall, Mo., grape, June 25, 1940, June 1941, G. D. Jones—10 ♂, 6 ♀; C. Mo., June 1887, C. V. Riley—1 ♂, 2 ♀; Dallas, Tex., April, May, June, 1907, 1909, Bishopp, Pratt, Schwarz—4 ♂, 4 ♀; Victoria, Tex., April 23, 1912—1 ♂; Columbus, Tex., May, June, E. A. Schwarz—1 ♂, 2 ♀; Tallulah, La., June 15, 1910, R. A. Cushman—1 ♂; Detroit, Mich., about 1874, Hubbard and Schwartz Collection—1 ♂, 2 ♀; Midland County, Mich., June, August 1939, 1940, R. R. Dreisbach—2 ♂, 2 ♀; Edgebrook, Ill., August 3, 1914, from Moznette Collection—2 ♂, 1 ♀; Porter, Ind., June 22, 1937, A. W. Trippel—1 ♂; New York, Ashton Collection—3 ♂; N. J. (perhaps mislabeled) in Schaeffer Collection—1 ♂.

Rhabdopterus weisei (Schaeffer) new combination.

Colaspis weisei Schaeffer 1920 (Brooklyn Ent. Soc. Bul., 15: 117), a substitute name for *C. subaenea* Schaeffer 1920 (N. Y. Ent. Soc. Jour., 27: 328) not Jacoby 1890 (Biol. Cent.-Amer. Coleopt., vol. 6, pt. 1, suppl. p. 224), is applied only to the unique male type in the Schaeffer Collection labeled Brownsville, Tex. It closely resembles specimens of *Rhabdopterus praetextus* from the same place, which Schaeffer pinned into his series under the name *R. picipes* or placed without study in the corner of his box, but it differs superficially from these in the stouter middle and hind tibiae and less enlarged basal tarsal joints. Its aedeagus, however, resembles that of *R. deceptor* but is more nearly parallel sided, the attenuate apex somewhat less attenuate, flattened with a median impressed line, and the undersurface is sclerotized.

Notes on Heliothiinae—Relationship of Heliosea fasciata Hy. Edw. and Heliosea pictipennis Grote.—In April 1941, I had the good fortune to visit the deserts of southern California during a season of unusual bloom. Collecting at Llano (Los Angeles Co.) in the Mohave Desert with Mrs. McElvare and Mr. and Mrs. John L. Sperry of Riverside, we found many specimens of *H. fasciata* and *H. pictipennis* on the flowers of the desert dandelion, *Malacothrix californica* DC., which was widespread at that season. The sky was heavily overcast and a surprisingly cold wind blew down from the snow covered San Gabriel Mountains. (The weather was said to be unseasonable.) Most of the flowers were closed and it was often necessary to push open the petals to find the sun loving moths, sluggish from cold, sitting inside. In this way we took a number in copulation, paired as follows:

♂ *fasciata* with ♀ *fasciata*—3 ♂ *pictipennis* with ♀ *pictipennis*—5
♂ " " ♀ *pictipennis*—6 ♂ " " ♀ *fasciata*—6

At the time it was not practicable to bring them east to breed. It would be interesting, if some western entomologist would try to breed some pairs and cross pairs and see what resulted. It seems likely that the "fawn drab" *fasciata* is a color form of the "vinous purple" *pictipennis* and not a separate species as currently rated.—Rowland R. McElvare, Port Washington, Long Island, N. Y.

***Pseudomasaris* in Wyoming and Nebraska (Hymenoptera, Vespidae).**—The following records, apparently the first for masarid wasps in these two states, were noted in the collections of the Department of Entomology at the University of Nebraska. *Pseudomasaris vespoides* (Cresson): Wyoming: Douglas, Converse Co. (C. E. Mickel); Laramie, Albany Co. Nebraska: War Bonnet Creek, Sioux Co. (M. A. Carriker). *Pseudomasaris zonalis* (Cresson): Nebraska: War Bonnet Creek, Sioux Co. (M. Cary).—J. Bequaert, Museum of Comparative Zoölogy, Cambridge, Mass.

LOCAL RECORDS OF BROOD 17 OF THE PERIODICAL CICADA.

By Wm. T. Davis, Staten Island, N. Y.

In Bulletin 71, U. S. Department of Agriculture, 1907, in "The Periodical Cicada," Dr. C. L. Marlatt states regarding Brood 17: "This brood is a precursor of Brood 1, and was indicated by the writer in Bulletin 18 (new series) of this Bureau. It comprises small or doubtful colonies only."

A comparison of the maps of distribution for Broods 1 and 17 as given in Bulletin 71, will show that the territory covered is about the same for each brood.

The first record for Brood 17, 1892, in Staten Island, was made by the writer in the Proceedings, Natural Science Association of Staten Island, Vol. IV, 1894, p. 15, where it is stated that: "On June 5th [1892], I heard a seventeen-year Cicada at West New Brighton, and the next day Mr. Leng's children caught me a specimen, and a few days later a second example. On the 11th of June there were many of the cicadas singing in the high trees about Logan's Spring brook, and on the 12th I heard one near Rossville."

In Bulletin 71 Dr. Marlatt commented on these observations as follows: "The scattering specimens recorded by Mr. Davis occurring on Staten Island in 1892 may also be assigned to this brood."

1909.

No 17-Year Cicadas reported on Long Island or Staten Island.

1926.

Several 17-Year Cicadas were reported on Staten Island in June. Two definite records were a cicada, and the shell from which it had emerged, found June 12 in the John Hales place at Eltingville, and on June 18 a cicada heard singing in the Little Clove Valley. On Long Island a female 17-Year Cicada was found dead on the ground at Calverton, July 14, 1926, by Mr. Roy Latham, who kindly gave me the specimen.

1943.

On June 11, Mr. and Mrs. Carol Stryker reported hearing one or two 17-Year Cicadas in a stand of young oaks along Martling's Lane, Staten Island. On June 13 they heard a cicada singing in the woods west of Richmond, and on June 14 more cicadas at Barrett Park and the Clove Road. Mr. Howard Cleaves heard two 17-Year Cicadas "droning their broadcast" in Mt. Loretto woods at Pleasant Plains, on June 13, 1943.

In nearby New Jersey, Mr. Frederick M. Schott of Bergenfield, was often in the Fort Lee area between June 2 and 18, where he heard a number of 17-Year Cicadas singing. He also found a female cicada with a deformed ovipositor, and two pupal cases.

It will be observed from these records that Brood 17 was nearly as well represented on Staten Island and vicinity in 1943, as was Brood 15 in 1941. In 1944 Brood 1 should have a still better representation, especially on parts of Long Island, as recorded in the Journal, N. Y. Ento. Soc., Vol. XVIII, Dec., 1910, and in the BULLETIN, BROOKLYN ENTO. SOC., Vol. X, Oct., 1915.

Nabis alternatus Feeding Observations. A moderately heavy infestation of the aphid, *Schizolachnus pini-radiatae* (Dav.) was encountered on yellow pine at "The Pines Camp Ground," in the foothills south of Mount Nebo, Juab County, Utah, July 12, 1942. An examination of this aphid infestation on several smaller trees revealed the presence also of numerous *Nabis alternatus* Parsh. Three adult damsel bugs were found to be feeding upon wingless individuals of this aphid upon undisturbed needles. In addition, smaller numbers of aphid lion larvae were found to be present and also feeding on the aphids. Along the bank of the stream, an examination of *Betula fontinalis* leaves revealed a male *N. alternatus* feeding upon a half-grown greenish leafhopper nymph. In an examination of sagebrush, south of Mount Nebo and in the bottom of the small valley, a *N. alternatus* was observed to be feeding upon a single sage aphid, *Aphis artemisicola* Wms., as it rested upon the apical leaves of a tall central twig. An examination of roadside grass at Marysvale, Utah, July 11, 1942, resulted in the finding of a *N. alternatus* feeding on an alate English grain aphid, *Macrosiphum granarium* (Kby.). In a potato field at North Ogden, a *N. alternatus* was found feeding on a spinach aphid, *Myzus persicae* (Sulz.), on July 23, 1942. On a roadside northeast of Provo, a *N. alternatus* was seen feeding on a wingless aphid, *Macrosiphum atripes* G.–P., on wild aster, September 18, 1942. When confined in a 3-dram vial with a variety of insects swept from roadside host plants, this female damsel bug soon attacked and inserted its stylets between the abdominal sclerites on the side of an adult rose leafhopper, *Typhlocyba rosae* (L.). A female *N. alternatus* was seen feeding on a half grown pea aphid, *Macrosiphum pisi* (Kalt.), in an infested alfalfa field at Gunnison, Utah, June 28, 1942.—G. F. KNOWLTON, Utah Agricultural Experiment Station, Logan.

NOTES ON THE SYNONYMY AND DISTRIBUTION OF AMERICAN HISTERIDAE (COLEOPTERA).

By J. Chester Bradley, Cornell University, Ithaca, N. Y.

Hololepta fossularis Say [= *aequalis* Say].—Say published both these names together. On basis of page priority Carnochen substituted *aequalis* for the long-used *fossularis.* Marseul, as first reviser, used *fossularis,* and his action stands.

Platysoma leconti Marseul [= *Platysoma depressum* Le Conte 1845 *nec Hister depressum* Fabr.].—Le Conte misidentified his material as *Hololepta depressa* Paykull 1811 [= *Hister depressum* Paykull, Fauna Suecica a misidentification of *Hister depressum* Fabr., 1787]. Marseul 1853 renamed the American species (misidentified by Le Conte as *depressum*) *leconti.* The European species he treated under the name *Platysoma depressum* Fabr. but Bickhardt 1916 sank it as a synonym of *compressum* Hbst. 1783. Nevertheless the name *depressum* is not available for any species of Platysoma later than Fabricius 1787, and the custom of recent American authors following Casey 1916 to use it as valid instead of *leconti* is incorrect and must be reversed. The original spelling was *leconti,* not *lecontei.*

Psiloscelis blanchardi Casey. This species is identified in the Le Conte and Fall collections as *repletus* J. E. Le Conte, as it was formerly in Casey's own collection. It is absurd for Casey to refer to *repletus* as a *nomen nudum* an act in which he has been followed by Hatch. *Repletus* was originally described at length and figured, hence is a fully available name. It may be considered a *species inquirenda* until the type can be located and examined, or a neotype selected, and in the meantime the name *blanchardi* may be retained.

Hister osculatus Blatchley and *H. dispar* Lec. Both belong to the subgenus *Paralister* although not mentioned by Hinton in his review of the subspecies of that genus (Can. Ent., 1936, 68: 268–272).

Pseudister hospes Lewis '02. This species was described from a specimen said to have been collected by H. H. Smith at Ulster, N. Y., and seems not to have been again found, at least I do not find it in any collection that I have examined nor did Casey see it. It was apparently known to Hinton (who published a key to the species in Can. Ent., 1935, 67: 11–15) only from the type and Casey had not seen it in 1916. All other species of *Pseudister* are neotropical, and as H. H. Smith collected extensively for many years in South America, sending much material to England it seems not unlikely that this may really be a South American insect. Smith's New York collecting was done many years earlier, is largely in the Cornell University collection and seems unlikely to have come into the hands of Mr. Lewis. At any rate the species should be regarded as a member of our fauna only with suspicion until it is re-discovered.

THREE NEW SPECIES OF TEXANANUS FROM THE WESTERN AND SOUTHWESTERN UNITED STATES.

By Dwight M. DeLong,* Columbus, Ohio.

By using the internal genital structures of the males it has been possible to obtain excellent diagnostic characters for the species of the genus *Texananus.* The species described at this time have previously been confused by similar external characters with other described species and identified under the names of species which they resemble very closely. *T. latipex* is closely related to *ovatus* and *lathropi; monticolus* resembles *cumulatus* and *ultratus* is very similar to *spatulatus.* Illustrations of the male genital structures are presented for more easy identification.

Texananus latipex n. sp.

Resembling *ovatus* in form and general appearance but smaller in size, paler and more uniform in color and with dorsal process of aedeagus more strongly curved. Length, 6 mm.

Vertex bluntly angled, almost twice as wide between eyes at base as median length, produced about half its length before the anterior margin of the eyes.

Color: Vertex, pronotum and scutellum yellowish, rather evenly marked with pale brown ramose pigment, basal angles of scutellum with dark brown spots. Two small brown spots on anterior portion of the disk. Elytra more heavily marked with brown pigment with three commissural spots distinct.

Genitalia: Female last ventral segment with posterior margin rather deeply, broadly excavated between the prominent lateral angles. Male valve rather long, triangular. Plates short with blunt apices, styles elongated and slender, bluntly pointed. Aedeagus in lateral view with the ventral portion rather long and tapered to an acute tip. Dorsal portion broad, strongly curved, sickle shaped, broadened apically and bifid at apex forming two stout teeth.

Holotype male, Ashford, Arizona, July 6, 1937, allotype female, same, and paratype males and females, same, and paratypes from Wickenburg, Arizona; Glenns Ferry, Idaho; Payette, Idaho; Corvallis, Oregon; Shoshone Basin, Idaho; Dixie

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* Department of Zoology and Entomology, Ohio State University.

National Forest, Nevada; Chiricahua Mts., Arizona; Faust, Utah; American Falls, Idaho; Tuttle, Idaho; Bruneau, Idaho, in author's collection. The Arizona specimens were collected by D. J. and J. N. Knull.

A pair of specimens labeled *T. lathropi* Baker collected at Los Angeles Co., Cal., by Coquillett have been forwarded to me for study by Mr. Oman. The male agrees exactly with the species described above but the female of *lathropi* is broadly, squarely excavated. Since the males described above have been collected with females in many localities and none show the excavated character of the last ventral segment it seems reasonable to believe that either the male forwarded by Oman is not the male of *lathropi* or the female is dimorphic in type. Only further collection or observation will prove or disprove this question since the types originally described as *P. annulatus* by Osborn and Lathrop have been destroyed.

Texananus monticolus n. sp.

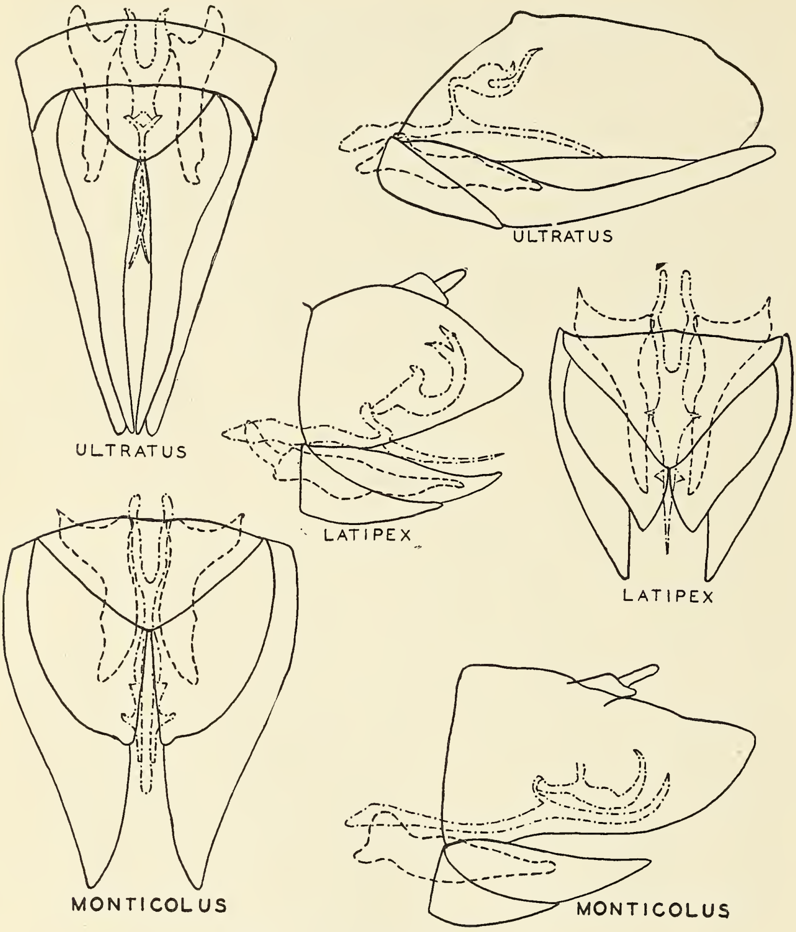
Resembling *cumulatus* in form and appearance but slightly larger, paler in color, and with ventral portion of aedeagus longer, broader and curved upward at caudal end of dorsal portion. Length, 6.5 mm.

Vertex short and broad, more than twice as wide as long, only about one-half longer on middle than next the eyes, broadly, bluntly angled. Elytra short and broad.

Color: Pale yellowish, vertex sparsely irrorate with brown, pronotum dark on posterior half, scutellum pale, markings indistinct. Elytra sparsely marked with brown pigment lines.

Genitalia: Female last ventral segment similar to *graphicus*, but with lateral angles more produced. Posterior margin with a rather broad deep V-shaped notch more than half way to base, either side of which is a rather deep rounded notch at base. Male plates strongly convexly rounded, apices blunt and rounded, inner margins straight to apices. Plates broader, more convexly rounded than *cumulatus* plates. Aedeagus with dorsal process elongate, apex narrowed and curved dorsally, enclosed in the concavity of the lower portion with curves dorsally at the caudal end of the dorsal portion.

Holotype male and paratype male from Jemez Springs, New Mexico, June 15, 1919. Allotype female and male paratype collected at Salina, Utah, July 24, 1930, and taken from *Quercus utahnus* by Mr. E. W. Davis.



Explanation of Figures

Lateral and ventral views of the male genital structures of species of *Texananus* as labeled.

Texananus ultratus n. sp.

Resembling *spatulatus* in form and appearance but with vertex more broadly rounded and with extremely long narrow male plates. Length, male, 7–8 mm.

Vertex broadly very bluntly angled, almost twice as wide between eyes at base as median length.

Color: Pale yellow, irregular brown irrorations forming a broken transverse band on vertex. Pronotum rather uniformly irrorate with brown. Scutellum pale. Elytra uniformly inscribed with ramose pigment lines.

Genitalia: Male valve semicircular, plates rapidly narrowed, about one-fourth the distance from base, and produced as long narrow apical processes with pointed tips. More than twice as long as combined basal width. Style long and narrow, apex blunt. Aedeagus similar to *spatulatus,* with a pair of long slender apical processes which extend about one-half the length of the plates.

Described from two male specimens. Holotype male labeled Arkansas and a paratype male labeled Arizona.

Notes on Heliothiinae—Confusion of Schinia velaris Grote with Schinia lanul Strecker.—Inspection of a number of collections, institutional as well as private, reveals *S. velaris* Grote confused with *S. lanul* Strecker. The type of *lanul,* from Texas, is in the Strecker Collection at the Field Museum, Chicago. One other specimen, also from Texas, is in the U. S. National Museum. The type of *velaris,* from California, is listed in the British Museum, and specimens from California are in a number of collections, not infrequently marked *lanul.*

When Hampson issued the Catalogue, he followed Strecker in considering *velaris* a synonym of *lanul.* Unfortunately, he used a specimen of *velaris,* from California, for his illustration of *lanul* in Plate LVI., Vol. IV. This illustration, a good representation of *velaris,* doubtless causes the confusion. *Velaris* is described in Canadian Entomologist XI, page 197, 1879; and *lanul* in Lep. Rhop. Het. Strecker, page 132, 1877.—ROWLAND R. MCELVARE, Port Washington, Long Island, N. Y.

Toxotus spinosus Hopping in Utah.—A single male specimen of *Toxotus spinosus,* recently described by the late Mr. Ralph Hopping, I took at Salt Lake City, on June 13, 1941. The type series were collected by Mrs. D. Fender at McMinnville, Oregon, and the Utah record extends the known distribution of the species considerably to the East. Additional series of about 15 specimens of both sexes, I captured on Coburg hills (Baldy Mountain) about 6 miles northeast of Eugene (June 29, 1941), while about 10 specimens were from the local Filbert Agricultural Experiment Station. The latter ones were found by Mr. R. Fauts in *Mellisopus*-moth traps, at Goshen, also in the vicinity of Eugene.—BORYS MALKIN, Eugene, Oregon.

THE COMPARATIVE MORPHOLOGY AND TAXONOMY OF SOME LARVAL CRIOCERINAE (COLEOPTERA, CHRYSOMELIDAE).

By Murl Beauford Sailsbury, University of Illinois, Urbana, Ill.

(*Continued from June number, p. 59*)

Mandibles (Fig. 24) identical, palmate, inner surface distinctly concave with two groups of brustia (Br) located proximad of the fourth and fifth teeth, respectively. Six distal teeth present of which the third is longest and about same size as fourth, first and second lateral in position and pointed, fifth blunt, and the sixth short and rounded. Margins of fourth sinuate. Margin of mandible proximad of sixth tooth sharply sinuate. Ectal surface of mandible with two well developed setae.

Ventral mouth parts incompletely sclerotized. Maxilla with a single somewhat elongate cardo (Fig. 15, Cd) an elongate stipes (St), and a galea (Ga). Cardo bearing one seta of moderate size; stipes with two setae, one on lateral margin and the other on ventral mid-caudal margin, galea with distal tip heavily sclerotized; bearing five setae and one sensory pore on ectal surface, and seven setae on ental (Ga) surface; setae large, spike-like. Palpiger (Pgr) with a broad, sclerotized ental surface on which are two setae and one sensory pore. Maxillary palpus (Mxp) consisting of three segments all provided with heavily sclerotized bases. Second segment longer than first, but not as broad, third segment longer than second, but not as broad. First segment having one sensory pore on ectal surface; second segment bearing a seta near each lateral margin and a sensory pore on both ectal and ental surfaces; third segment with a small seta on mesal margin and a sensory pore on ectal surface. Distal tip incompletely sclerotized and bearing numerous sensory cones.

Hypopharynx (Fig. 18) somewhat membranous. Hypopharyngeal setae replaced by three pairs of hypopharyngeal sensory pores (Hyp). Superlinguae (Sl) are represented by a pair of raised, creased areas, dorsad and slightly laterad of paired sensory pores. No setae evident on superlinguae. Hypopharyngeal sclerites (Hysc) present, curved laterad near dorsal extremity, and imbedded in superlinguae; margins smooth.

Labium (Fig. 15) set off from maxillae by a ventral sclerite irregular in shape and whose dorsal margin is rather indefinite. Two paired setae placed laterad on sclerite; ventral pair more mesal in position. Dorsal margin of prementum (Prmt) marked by a sclerite doubly arched on ectal surface; sclerite apparently not continuous from ectal to ental surface; one pair of setae on both ectal and ental surfaces; ectal seta dorso-mesad from labial palpus. Labial palpus (Lbp) one-segmented with a large sclerotized base; on ectal surface one sensory pore mesal in position; on ental surface (Fig. 15) two sensory pores, one mesal and one lateral in position. Distal tip of palpus incompletely sclerotized and provided with numerous small cone-shaped sensoria. Ligula (Lg) indistinctly separated from prementum; ventral surface broad, somewhat membranous and provided with one pair of setae.

Spiracles nine pairs, biforous, prominent. Mesothoracic spiracle slightly larger than abdominal spiracles, all of which are about the same size. Peritreme darker than adjacent cuticula.

Prothorax about five times as broad as long; tergal shield (Fig. 27, Tgs) conforming to curvature of prothorax but slightly raised; surface irregular and having a mid-dorso-lateral crease; surface marked with brown pigmented areas as is the head capsule. Shield provided with an irregular cephalic row of seven setae, a caudal row of four setae, two dorsal and two lateral, and a mid-lateral seta at ventral tip of shield. Laterotergite having two setae. Spiracular area inconspicuous. Episternum (Eps) and epimeron (Epm) bearing one seta each. These two sclerites separated by a rather inconspicuous sclerite (Cxa) to which the coxa is articulated. Sclerite for coxal articulation, episternum, and epimeron same color as adjacent cuticula. Presternal sclerites separate and bearing one seta each (Psc). Eusternum and sternellum fused (Estl); sclerites separate and bearing two setae each. Posternellum not indicated.

Mesothorax broader than prothorax; metathorax broader than mesothorax. Primary distinction between meso- and metathorax is the spiracle on the former and the greater width of the latter; with these exceptions segments identical. Tergum (Fig. 27) divided by a groove running latero-ventrad to vicinity of spiracle. Cephalad of this groove is the prescutum which bears the meso-spiracle, and also apparently a pore (Po) on dorsal surface. Laterotergite (Lt) bearing two setae. Caudad of the groove the scuto-scutellum bearing a row of six setae arranged in groups of two (1, 2, 3, 4, 5, and 6). Ventrad from this row of six a mid-lateral sclerite (7) bearing two setae; ventrad to this a ventro-lateral sclerite (8) bearing one seta. Episternum (Eps) and epimeron (Epm) bearing one seta each; sclerites separated by a rather inconspicuous sclerite to which coxa is articulated. Postscutellum not indicated. Presternal sclerite not indicated. Sclerites of eusternum and sternellum paired and distinct. Eusternum (Eust) bearing one seta on each sclerite; sternellum (Stl) with two setae on each sclerite. Poststernellum indistinguishable.

Legs (Fig. 12) each consisting of coxa (Cx), femur (Fe), tibio-tarsus (Tb-Tr), a claw (Cl), and a pulvillus (Pu); well developed; the imaginary lines connecting coxae diverging caudad. Legs of prothorax slightly smaller than meso-legs, and meso-legs slightly smaller than meta-legs. Coxa of each leg articulated to an inconspicuous sclerotized plate (Cxa) between episternum and epimeron. Legs yellow with margins of coxae and femur slightly darker. Claw brown, curved, pointed, spike-like, and base not enlarged; margins smooth and regular. Pulvillus on ental tip of tibia-tarsus and removed from claw; grayish.

Abdominal segments one through seven divided dorsally into two transverse areas, the prescuto-scutum (Fig. 9, Prs) and the scutellum (Scl). Grooves separating the areas discernible and extending on either side a short distance. (In some cases to groove dividing the segments.) Each area having a row of setae in some instances borne on small sclerites the same color as adjacent cuticula. Prescuto-scutum bearing two setae; one (1) dorsal and the other (5) lateral. Spiracular area bearing a spiracle and one paired seta (7) dorso-caudad from spiracle. Scutellum having four setae; two (2, 3) dorsal, one (4) dorso-lateral, one (6) ventro-lateral, the latter borne on a small somewhat conspicuous sclerite. Laterotergite (Lat) tuberculated, sclerotized, and bearing two setae. Pleuron with one paired primary seta (8) and two cephalic secondary setae (S 1 and S 2). Eusternum with three, paired, secondary setae (S 3, S 4, and S 5), and paired pseudopods (9) each bearing two setae. No sclerites or setae on sternellum. Laterotergal setae located on raised, somewhat tuberculated areas of each segment.

Eighth segment is shortened and bears a caudal row of about four setae. This segment appears to be unidivided dorsally, but does possess a sternum.

Ninth abdominal segment narrowed ventrally, therefore possessing no pseudopod. Prescuto-scutum having a row of five, paired setae; scutellum with a row of three, paired setae. No posternellum indicated. Anal opening present on this segment.

Tenth abdominal segment developed as a short pygopod and bearing a pair of setae on each lateral margin.

KEY FOR THE DETERMINATION OF THE SUBFAMILIES OF LARVAL CHRYSOMELIDAE.

(After Paterson, Proc. Zool. Soc. Lond., 1931, p. 945.)

A. Body dorso-ventrally flattened. With faecal fork and lateral scoli; labial palpus of one segment; maxillary palpus two-jointed; five larval instars .... CASSIDINAE

B. Body subcylindrical.

- I. Anal proleg present; spiracles uniforous; mid-dorsal frontal invagination conspicuous.
  - (a) Antenna and maxillary palpus three-jointed; six ocelli; clypeolabral suture straight; tormae present; lacinia absent .... CHRYSOMELINAE
    - 1. Abdomen very convex; no metameric eversible glands.
      - (i) Seven pairs of abdominal spiracles; mandibular teeth ill defined; palpigers distinct. TIMARCHINEA
      - (ii) Eight pairs of abdominal spiracles; mandible five-dentate; palpigers indistinct; at least three pairs of egg bursters; four larval instars .... CHRYSOMELINA
    - 2. Abdomen less convex; metameric glands present; first instar with two pairs of thoracic egg-bursters.
      - (i) Form short and stout; tubercles well demarcated; posterior subspiracular tubercle present in prothorax; seta III. developed in abdomen .... PHAEDONINA
      - (ii) Form more elongate, somewhat flattened; tubercles inconspicuous; posterior prothoracic tubercle not demarcated; seta III. absent in abdomen .... PRASOCURINA

(b) Antenna of one joint; maxillary palpus short, sometimes two-jointed; less than six ocelli; clypeolabral suture curved; no tormae; lacinia present. Trichostomata
1. One pair of ocelli; prothoracic subspiracular tubercle bearing setae IX. and X.; no egg-bursters. Galerucinae
2. No ocelli; prothoracic subspiracular tubercle bearing group X. only; short chitinous egg-bursters present on thorax in first instar . . Halticinae

II. Anal proleg indistinguishable; biforous spiracles present; no mid-dorsal, frontal invagination.
(a) Case bearers; legs elongate; posterior extremity of abdomen dilated and curved anteriorly. Camptosomata
Six ocelli; epicranial stem short; no lacinia; labial palpus two-jointed . . . . Cryptocephalinae
(b) No larval case; legs short; abdomen straight; labial palpus one-jointed . . . . Eupoda
1. Six ocelli; no lacinia; primary chaetotaxy distinguishable in old larvae; no abdominal appendages . . . . Criocerinae
2. Five ocelli; lacinia present; primary chaetotaxy obscured in old larvae; abdominal appendages for respiration . . . . Donaciinae

A. Pupa dorso-ventrally flattened; with lateral abdominal expansions; pupation on leaf-surface . . . . Cassidinae

B. Pupa rarely flattened; no lateral processes.
I. Pupation within larval case . . . . Camptosomata
II. Pupation within a cocoon . . . . Eupoda
III. Pupation on leaf-surface or in the ground.
(a) Head with at least four pairs of setae; body chaetotaxy irregular; ninth abdominal segment ending in a chitinous spine . . . . Chrysomelina
(b) Head with three pairs of setae; body chaetotaxy regular.
(i) Lateral abdominal tubercles with one seta; terminal spines paired . . . . Trichostomata
(ii) Lateral abdominal tubercles with two setae; no abdominal spines . . . . Phaedonina
Prasocurina

KEY TO LARVAE OF THE SUBFAMILY CRIOCERINAE.

1. Claw not spike-like, but curved, with proximal end enlarged; pulvillus large and filling inner margin of claw; body segments possessing large distinct tubercles; anal opening on tenth; no pseudopod on eighth; three pairs hypopharyngeal setae; mandibles five-toothed .... *Criocerus* (2)

Claw spike-like, curved, with proximal end not enlarged, margins regular; body tubercles, if present, reduced; anal opening on ninth; no pseudopod on ninth; at least one pair of hypopharyngeal setae absent, being replaced by pores; mandibles six-toothed .... *Lema* (3)

2. Cervix prominent; ventro-lateral ends of epicranial arms indistinct, but present; head capsule evenly dark brown. *asparagi*

Cervix reduced; epicranial arms conspicuous throughout their entire length; arms yellow. Head capsule dark brown, but feebly mottled; ventral margin of clypeus yellowish. *duodecimpunctata*

3. Head capsule shiny brown; fronto-clypeal suture incomplete mesally, epipharynx with two large setae on each lateral half; two pairs of hypopharyngeal setae; mandibles without brustia .... *trilineata*

Head capsule light (yellowish); fronto-clypeal suture complete; epipharynx with sixteen large setae on each lateral half; all hypopharyngeal setae absent, being replaced by pores; mandibles with two groups of brustia on inner surface. *sexpunctata*

SUMMARY.

Combining Paterson's summary of the Criocerinae (1931) with the author's observations, the Criocerinae resemble Chrysomela in their somewhat arched body, but differ in having no large distinct pygopod, and also in that their spiracles are large and biforous. The anus is located at the caudal extremity of the abdomen and is more dorsal in position than in the majority of Chrysomelid larvae. The ventral surface of the abdomen bears pseudopods; either the eighth or ninth ones being absent. Laterally, the abdomen usually bears one or two rows of tuberculated areas. The mandible has five or six teeth.

The larvae of the two genera in America may be characterized as follows:

Crioceris.—Mandibles five-toothed. Three pairs hypopharyngeal setae. Each abdominal segment with two well developed tubercles, one lateral the other ventro-lateral. No pseudopod on eighth abdominal segment; anal opening on tenth. Claw with caudal margin curved outward and enlarged at proximal end; pulvilli large and fitting snugly against inner margin of claw.

Lema.—Mandibles six-toothed. At least one pair of hypopharyngeal setae absent. Each abdominal segment bearing laterally one feebly tuberculated area. No pseudopod on ninth abdominal segment. Anal opening on ninth. Claws spike-like with margins smooth; proximal end not distinctly enlarged; pulvilli borne on tip of tibio-tarsus and removed from claw.

The larvae of the four species concerned in this study may be characterized as follows:

C. asparagi Linné.—Head capsule, except genae which are lighter, evenly dark brown.

C. duodecimpunctata Linné.—Epicranial arms yellow and conspicuous throughout their entire distance. Cervix reduced. Head capsule brown, somewhat mottled, and with genae and ventral tip of clypeus lighter. Cervix reduced.

L. trilineata (Oliv.).—Head capsule shiny brown; fronto-clypeal suture incomplete mesally. Epipharynx bearing two setae on each lateral half. Two pairs of hypopharyngeal setae present, one pair being replaced by pores.

L. sexpunctata Oliv.—Head capsule light in color and pitted; fronto-clypeal suture complete. Mandible with two groups of brustia on inner surface. Epipharynx with sixteen large setae on each lateral half. All hypopharyngeal setae absent, being replaced by pores.

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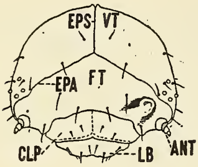
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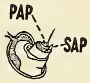

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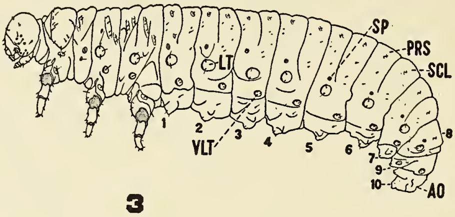
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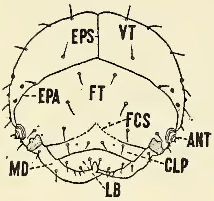
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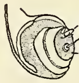

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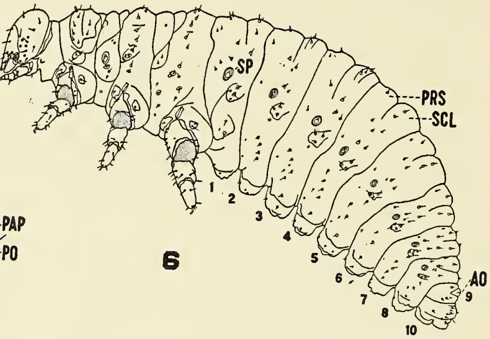
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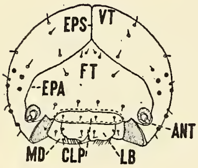
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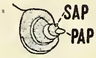

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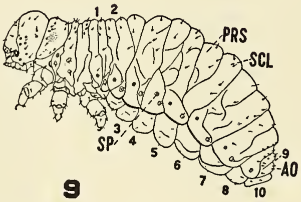
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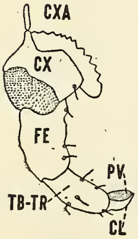
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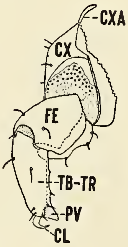
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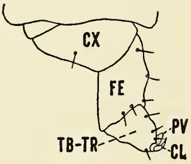
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EXPLANATION OF FIGURES.*

Figure 1. *C. asparagi* Linné—Head, cephalic aspect. ANT, antennae; CLP, clypeus; EPA, epicranial arm; EPS, epicranial stem; FT, front; LB, labrum; VT, vertex.

Figure 2. *C. asparagi* Linné—Left antenna. PAP, papilla; SAP, sensory appendix.

Figure 3. *C. asparagi* Linné—Larva, sinistral aspect. AO, anal opening; LT, laterotubercle; PRS, prescuto-scutum; SCL, scutellum, VLT, ventro-lateral tubercle.

Figure 4. *L. trilineata* (Oliv.)—Head, cephalic aspect. Lettering as in Fig. 1; FCS, fronto-clypeal suture.

Figure 5. *L. trilineata* (Oliv.)—Left antenna. PAP, papilla; PO, sensory pore.

Figure 6. *L. trilineata* (Oliv.)—Larva, sinistral aspect. Lettering as in Fig. 3.

Figure 7. *L. sexpunctata* Oliv.—Head, cephalic aspect. Lettering as in Fig. 1.

Figure 8. *L. sexpunctata* Oliv.—Left antenna. Lettering as in Fig. 2.

Figure 9. *L. sexpunctata* Oliv.—Larva, sinistral aspect. Lettering as in Fig. 6.

Figure 10. *C. asparagi* Linné—Sinistral mesothoracic leg. CL, claw; CX, coxa; CXA, coxal articulation; FE, femur; PV, pulvillus; TB–TR, tibio-tarsus.

Figure 11. *L. trilineata* (Oliv.)—Sinistral mesothoracic leg. Lettering as in Fig. 10.

Figure 12. *L. sexpunctata* Oliv.—Sinistral mesothoracic leg. Lettering as in Fig. 10.

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* All drawings made by the author.

Figure 13. *C. asparagi* Linné—Ventral mouth parts, ectal aspect. CD, cardo; GA, galea; LBP, labial palpus; LG, lugula; MT + SMT, postmentum; MXP, maxillary palpus; PGR, palpiger, PRMT, prementum; ST, stipes.

Figure 14. *L. trilineata* (Oliv.)—Ventral mouth parts, ectal aspect. Lettering as in Fig. 13.

Figure 15. *L. sexpunctata* Oliv.—Ventral mouth parts, ectal aspect. Lettering as in Fig. 13.

Figure 16. *C. asparagi* Linné—Ventral mouth parts, ental aspect. HYS, hypopharyngeal setae; HYSC, hypopharyngeal sclerites; SL, superlinguae.

Figure 17. *L. trilineata* (Oliv.)—Ventral mouth parts, ental aspect. Lettering as in Fig. 16; HYP, hypopharyngeal pore.

Figure 18. *L. sexpunctata* Oliv.—Ventral mouth parts, ectal aspect. Lettering as in Fig. 16.

Figure 19. *C. asparagi* Linné—Epipharynx. CP, chitinous plate; SO, sensoria.

Figure 20. *L. trilineata* (Oliv.)—Epipharynx. SC, sensory cones; SO, sensoria.

Figure 21. *L. sexpunctata* Oliv.—Epipharynx. SO, sensoria.

Figure 22. *C. asparagi* Linné—Right mandible, ental aspect.

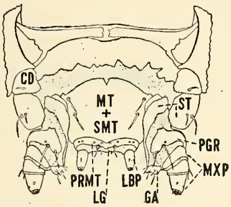
Figure 23. *L. trilineata* (Oliv.)—Right mandible, ental aspect.

Figure 24. *L. sexpunctata* Oliv.—Right mandible, ental aspect. BR, brustia.

Figure 25. *C. asparagi* Linné—Setal chart. PRO, prothorax; MESO, mesothorax; 1A, first abdominal segment; CXC, coxal cavity; EPM, epimeron; EPS, episternum; ESTL, eusternum + sternellum; PSC, presternal sclerite; S1 . . . etc., secondary setae; SP, spiracle; TGS, tergal shield; TLT, laterotubercle; 1, 2, etc., primary setae.

Figure 26. *L. trilineata* (Oliv.)—Setal chart. Lettering and numbers as in Fig. 25.

Figure 27. *L. sexpunctata* Oliv.—Setal chart. Lettering and numbers as in Fig. 25. EUST, eusternum; STL, sternellum.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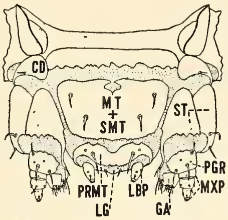
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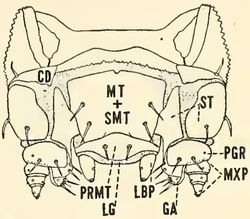
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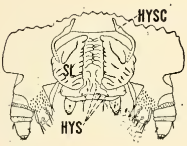

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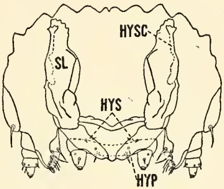
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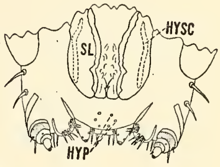

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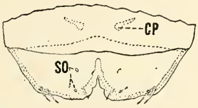

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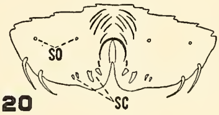

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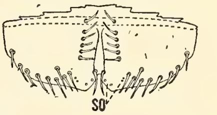

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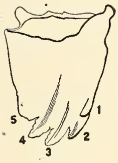

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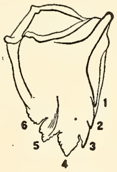

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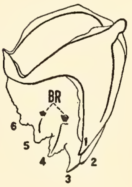

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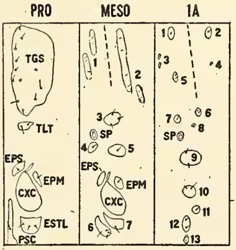
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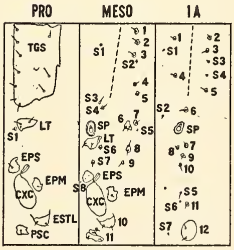
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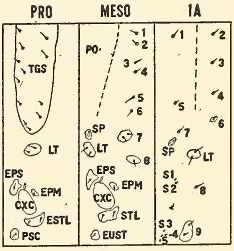
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ORCHELIMUM FEEDING NOTES.

By G. F. Knowlton and R. S. Roberts, Utah Agricultural Experiment Station, Logan, Utah.

A meadow grasshopper, female *Orchelimum* sp. (det. Dr. H. K. Towns), collected in an alfalfa field at Logan on July 20, 1942, was placed in a glass tube cage 1 inch in diameter by 3 inches high, containing a small sprig of alfalfa and 5 pea aphids, *Macrosiphum pisi* (Kalt.). With but 30 aphids supplied the first three days this grasshopper ate the aphids, then fed to a limited extent on the alfalfa. On July 23, 150 third and fourth instar and adult pea aphids were placed in the cage within an hour; the first 50 placed in the cage were eaten within 10 minutes, and a total of 90 were consumed within 30 minutes; at the end of 24 hours, 146 of the 150 aphids had been eaten; at this time the abdomen of the grasshopper was much distended from which condition it did not fully return to its former size. In feeding the grasshopper usually would grasp an aphid with its pro-thoracic tarsi and bring it to its mouth, readily eating the aphid regardless of the position the predator was in when the prey was captured. This *Orchelimum* was observed to feed while standing normally, resting on its head, lying on its back and while on its side. By July 27, the grasshopper was very tame, readily grasping the aphids from the forceps when they were introduced in this manner. On the eighth day, the grasshopper began chewing on the cork which comprised the bottom of the cage, through which the living sprig of alfalfa passed; such chewing occurred thereafter almost every day; also some slight nibbling on the alfalfa, but this occurred only on two occasions after the third day. On August 9, this grasshopper seemed at first to prefer chewing cork to eating aphids. Of 1000 third and fourth instar and adult pea aphids introduced into the cage from July 20 to August 12, only 10 of these were not eaten. This was an average pea aphid consumption of approximately 43.5 per day for the 23 days during which observations were made. Doubtless many more aphids would have been eaten had larger numbers been supplied regularly.

Seventy-five pea aphids, two *Lygus elisus* Van D., two small and one larger alfalfa caterpillar were caged with this predator on July 30. By next day all of these except five of the aphids had been captured and eaten.

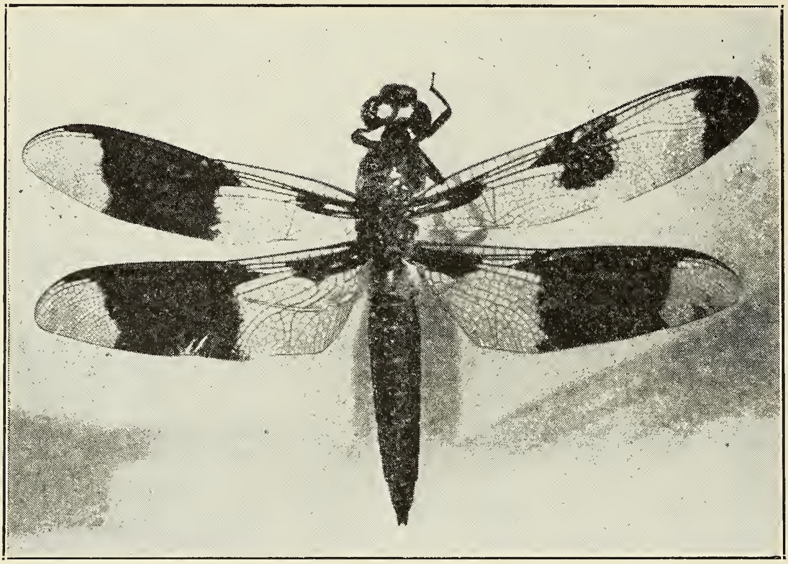
Eight adult *Lygus elisus* and *L. hesperus* Knt. adults and three nymphs, besides one adult *Nabis alternatus* Parsh. and one winged pea aphid were introduced into the cage on August 13. Next day four adult and two nymphal *Lygus,* the *N. alternatus* and the winged pea aphid had been eaten. The following day, one more adult and the nymphal *Lygus* were eaten, the remaining three insects being consumed by the following day. At this time the grasshopper abdomen again had become conspicuously large, giving a typical "well-fed" appearance. By this time the meadow grasshopper had lost four of its tarsi, and had chewed away the distal three-fifths of its ovipositor.

This grasshopper apparently has not been abundant in Utah pea aphid infested fields; its benefit as a predator evidently is rather limited.

Stingless Bees Nesting in Association with Ants (Hymenoptera).—In July, 1936, at Muzo, Dept. Boyacá, Colombia, I observed a voluminous nest placed in a bush some five feet above the ground. It was closely woven of a fibrous material apparently taken from some plant, not of silk secreted by larvae. When found, it harbored a thriving colony of the aggressive ant, *Dolichoderus* (*Monacis*) *trispinosus* (Olivier). The late Prof. W. M. Wheeler, who named it, informed me, however, that this *Dolichoderus* is not known to weave a nest of its own, but instead usurps existing nests, particularly of termites and sometimes of other ants. He suggested that the nest found at Muzo may have been built by an *Azteca,* which was later driven from it by the *Dolichoderus.* At the time of observation part of the nest was also occupied by a colony of a small stingless bee, *Trigona* (*Paratrigona*) *opaca* Cockerell, seemingly on friendly terms with the *Dolichoderus.* Mr. Herbert F. Schwarz, who kindly named the bee, called my attention to published accounts of similar associations, which he intends to discuss in his forthcoming Monograph of *Trigona.* Two myrmecophilous beetles were bred from the *Dolichoderus* colony: one a paussid, *Homopterus steinbachi* Kolbe; the other a cremastochilid of the genus *Genuchinus* (according to Prof. A. Reichensperger).—J. Bequaert, Museum of Comparative Zoology, Cambridge, Mass.

Lofty Mantis Egg-case.—Near Seaford, L. I., the egg-mass of a praying mantis, *Tenodera sinensis,* was observed attached to the branch of a slender birch tree. The egg-case was found to be more than fifteen feet from the ground.—Edwin Way Teale, Baldwin, L. I., N. Y.

A Dragonfly Gynandromorph.—A specimen of *Plathemis lydia* Drury caught at Woodlands, Westchester Co., New York, July 26, 1934, makes a striking addition to our list of heterosexual Odonata. The accompanying photograph will show at a glance the distribution of the sexual color pattern of the wings. The right forewing has the normal female pigmentation and the remaining three wings the normal male pattern except for slight additional diffusion of color at the outer margin near the tip of the right hind wing. The terminal appendages are without aberration but the external genitalia of the second segment are lacking the right hamule.



Few heterosexual dragonflies have been described. An abnormal *Aeschna juncea* was mentioned by Harrison (Entomologist, Vol. 72, p. 286, 1939) but was not described. *Calopteryx splendens* recorded by Westwood, *Rhyothemis phyllis* by Martin and *Calopteryx virgo* by Ris have all been redescribed by Dr. Ris (Mitteilungen der Schweizerischen Entomologischen Gesellschaft, Vol. 14, pp. 97–102, Figs. 1–3, 1929).

The specimen has been placed in the collection of the American Museum of Natural History.—Elsie Broughton Klots, Mount Vernon, N. Y.

Vol. XXXVIII DECEMBER, 1943 No. 5

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OF THE

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BULLETIN
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Vol. XXXVIII December, 1943 No. 5

NEW SPECIES OF NORTH AMERICAN GOMPHINE DRAGONFLIES AND LIFE-HISTORY NOTES ON SOME OF THEM.

By James G. Needham, Ithaca, N. Y.

Among the dragonflies that have been accumulating in my collection during recent years there are several new species. There is also some new life-history material that I wish to put on record. I begin with a new species of which I have both adult and nymphal stages.

Gomphus mortimer sp. n. Fig. 1, A, B, C and D.

Length 50 mm.; abdomen 38; hind wing 29.

This is a blackish species, faintly striped with greenish. Face wholly pale. Top of frons also pale in front, but its basal third is covered with a cross stripe of brown, the margin of which projects forward a little in the middle longitudinal furrow. This stripe is confluent with the black that covers the entire vertex, though the latter is paler behind the low, transverse, three-lobed, post-ocellar ridge. Antennae black. Occiput yellow; its high circular hind margin edged with brown and fringed with long brown hairs. There is a similar fringe of hairs behind each eye, and another below at the front. The whole face is thinly pilose.

Prothorax brown above, with a small median yellow twin spot and a larger spot each side on the middle lobe. The whole thorax is thinly clad with brownish hairs (whitish about the leg bases). The front of the synthorax is fuscous striped with greenish. On the front are the usual two pale stripes each of them wider than the intervening fuscous band. This median band is narrowly divided by a yellow middorsal carina. Each of the greenish stripes is dilated below to overspread the collar and at its upper end each is prolonged laterally, underneath the

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crest toward the upper end of a narrow antehumeral greenish stripe. Behind the fuscous band that broadly covers the humeral suture, the sides of the synthorax are more greenish than brown, with narrower and more diffuse dark stripes covering the other lateral sutures. The one on the middle suture is bent and interrupted above the spiracle; the one behind it is entire. All these brown stripes are conjoined above on the subalar carina and below near the leg bases, and the rearmost one is prolonged to rearward at its lower end around the border of the metepimeron in a fuscous J-mark.

The wings are hyaline with brown veins. Ante- and postnodals are 12–14; 10–12 and 9; 10–11 in fore and hind wing respectively. Behind the anal vein of the hind wing in each of the interspaces bordering vein A2 there are first two or three single cells and then two rows thereafter to the hind margin. There is a single, triple-length cell bordering the hind end of the male anal triangle. The legs are black beyond the short basal segments except for the under side of the front femora; the joinings of the tarsus and the claws are touched with yellow. The dense comb on the inner side of front tibia is brown.

The abdomen is blackish on the middle segments, with the usual middorsal line of lanceolate pale spots; very narrow beyond segment 2. The sides of 1, 2 and the base of 3 are extensively yellow including the auricle. A transverse ridge at the rear of the dorsum of segment 1 bears a tuft of long brown hairs. The caudal appendages of the male are blackish, as is also the anterior hamule of the second segment; the posterior hamule is brown-tipped and hairy externally. The 8th and 9th abdominal segments are wanting, from the type specimen, having been destroyed by anthrenids, but the uninjured appendages are preserved and are shown in figure 1, *C*.

The peduncle of the penis is blackish, higher (vertically) than wide, truncated at the end, deeply channeled at the front, and rugose and hairy at the rear, and the single, sickle-shaped cornicle of the penis is very short, and tapered to a Y-shaped fork at the tip. The superior caudal appendages of the male are rather short and stout, and each has a large obliquely placed and downwardly directed inferior tooth, which projects to rearward and inward and is visible from above, opposite and a little distal to a rather sharp angulation on the outer side that bears a minute inferior denticle. The inferior appendage is short and very widely forked, its branches spreading far outside the superiors.

This species is nearest *Gomphus quadricolor* but smaller. The color pattern is very similar but the black areas in this are less extensive and the claws are partly yellow. The tenaculum-like hook of the anterior hamule is longer. The apical tooth of the superior appendage of the male as seen in side view in *quadricolor* is absent in *mortimer,* or at least there is no distinct notch setting it off from the large more proximal tooth. The outer margin of the superior appendage in *quadricolor* runs out directly to the apex and is not cut off on a long bevel as in *mortimer.* The fork of the inferior appendage is much more widely outspread in *mortimer.*

The peduncle of the penis is high while that of *quadricolor* is low, mound-like, broadly rounded (Fig. 1, *B*).

Two specimens were collected by myself in Chipola Lake, Florida, in April, 1929. They were taken on a moss-covered, floating cypress log. Both were males. One was rather teneral, but had the color pattern fully developed. It is the one on which the above description of the adult is based. The other was in process of transformation, with head and tail not fully withdrawn from the nymphal skin. On the latter is based the following description of the nymph. The genitalia of the emerging specimen were sufficiently developed for determination that both specimens belonged to one and the same species.

> *The nymph* measures in total length 31 mm.; abdomen 20; width of head 6; of abdomen 7. It is patternless, and of the usual slender form, similar to that of *quadricolor.*[1] The middle lobe of the labium is slightly convex in front. The lateral lobe terminates in strong arcuate end hook, before the tip of which on the inner margin there are about six strong teeth. These teeth are largest in the middle of the row and all are sharply and obliquely truncated with points directed proximally.
>
> The abdomen bears vestiges of middorsal hooks on segments 7 to 9. On 3 to 7 the scars upon the sides of the segments are in bulging clusters; they are lower on 8 and 9. There are strong and sharp lateral spines on 6 to 9, smaller on 6, subequal on 7 and 8, longer on 9, where they are about one-fourth as long as the cylindric 10th segment. The superior and inferior appendages are subequal in length, with the laterals about one-seventh shorter.

The chief differences seem to be that the teeth on the inner margin of the lateral labial lobe are larger and more deeply cut, the superior and inferior appendages of the abdomen are of more nearly equal length with the laterals almost as long.

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[1] See Walker's figure in Canad. Ent., 64: 271, 1932.

I take pleasure in naming this pretty little Gomphine for my good friend and ofttimes field-work associate, Dr. Mortimer Demarest Leonard. He took Professor C. R. Crosby and myself by automobile to Chipola Lake, Florida, for a collecting trip that will ever be memorable for the uniqueness of the environment and its pleasant associations.

Gomphus (Stylurus) jucundus sp. n. Fig. 1, E, G and H.

Length 54 mm.; abdomen 40; hind wing 33.

This is a blackish species, much like *G. plagiatus,* but smaller. The face is olivaceous, yellowish about the mouth, with black-edged labium and black-tipped mandibles. The labrum has a broad blackish border and a brown median longitudinal stripe. The sutures of the face are narrowly brown and twin areas of black overwash cover most of the vertical face of the frons. The occiput is yellow, its outer corners brown, its hind border slightly prominent and scantily fringed with long black hairs.

The prothorax is obscurely infuscated, its dorsum with a yellow front lobe, and the median lobe with a pair of submedian yellow spots. The synthorax is dark brown in front, with a yellow crossband on the collar that connects with the yellow of the carina. The dorsal yellow stripes are isolated and strongly divergent forward, reaching nearer to the collar below than to the crest above. The edges of the crest are black. The sides of the synthorax are yellowish, with black stripes on all the lateral sutures, the one on the humeral suture being widest.

The legs are all black beyond their bases except for the pale under side of the front femora. The wings are hyaline, with brown veins and blackish stigma. Ante- and postnodal crossveins 13–14: 8–9 and 10: 9 in fore and hind wing respectively. In the fore wing there are six cells in the paranal row (the row behind the anal vein) with two additional intercalated cells next the wing margin. In the hind wing there are four paranal cells and five postanals.

The abdomen is blackish, but with the sides of segments 1 and 2 mostly yellowish, with black bars on 2 that run down the sides, one behind the auricle and the other on the apical intersegmental margin. There is the usual middorsal pale stripe that is widest on 1, trilobed on 2, narrowed to a line on the middle of 3, reduced to basal spots on 4 and 5, becomes a basal triangle on 6 and 7, the one on 7 being longer than that on 6; 8, 9 and 10 are black, a little paler basally. The expanded sides of segments 8 and 9 are mostly yellow with black borders. The dorsum of the 10th segment ends in a little triangular tooth that projects to rearward between the bases of the superior caudal appendages.

The superior caudal appendages of the male are strongly divergent at the base, and so obliquely beveled beyond the middle that the outer sides of the pair are parallel in the distal half; the beveled margin is crenulate-toothed on the under side. The branches of the inferior appendages in their spread match the superiors, and are almost as long. On the tip of each branch is a black sharply-upturned tooth. Before that tooth there is a pit in the upper surface, that would seem to fit an erect spine on the head of the female.

The genital pocket of the second segment is very hairy about the edges. The posterior hamule is lanceolate, strongly inclined forward to its slender tip; the hidden anterior hamule lies across its base within; it may be seen from the side as it emerges from under an enlarged, bilobed anterior lamina. The bulging peduncle of the penis is inclined forward, not deeply cleft but contracted at the top by infolding of the rim at the back.

The female is slightly larger (length 56 mm.) and similar to the male in general pattern, but less deeply pigmented, having no black on the vertical face of the frons, the sides of the abdomen largely olivaceous, and segment 10 and the caudal appendages black. On each side of the vertex of the head a short sharp, black, pyramidal horn arises between the lateral ocellus and the eye. On the under side of the 8th abdominal segment the subgenital plate appears to be recessed in the sternum, hardly reaching to rearward upon 9. It is rather shallowly bilobed on the end, and divided longitudinally by a median groove.

Type and *Allotype,* a single pair taken in copulation at Crown Point, New York, on July 30th, 1939, by Dr. Archie Hess.

Gomphus argus sp. n. Fig. 1, F.

The following description is drawn from a single specimen that was collected twenty years ago, and recognized at once as a new species. Because it lacked the last five segments of the abdomen it was put aside to await more and better material for description.

Meanwhile I have made several collecting trips to the spot where it was found, and have told several entomologists who go there betimes to be on the lookout for it, but no more have been found. Meanwhile dermestids ruined the body of the one lone specimen, and there now remains available for description only the wings and the basal half of the abdomen. That half, however, has the second segment well preserved; and since the hamules of the male are of quite distinctive form and will alone be sufficient for recognition of the species, and since I do not expect to have another chance to search for more, I herewith describe it and offer figures of the male hamules.

Length of hind wing 29 mm.

The species is perhaps as nearly allied to *G. descriptus* as to any other. Its wings are hyaline with brown veins and stigma. The nodal crossveins are 13: 11 and 9: 9 in fore and hind wing respectively. The triangles have the front side a little broken near the outer angle, making them slightly four-sided; in the space beyond them there are two rows of cells, with an extra cell at the triangle in the hind wing only. There are five crossveins under the stigma in addition to the strong brace vein. Ranged along the anal vein in the fore wing there are five cells, with an added marginal cell behind the one in the middle of the row. In the hind wing there are four cells bordering the anal vein and five postanal cells bordering vein A1 and five bordering vein A2; the corresponding interspaces of these two anal branches are about of equal width, or that behind A2 is perhaps a little wider. In it, the cell which forms the hind angle of the wing is enlarged transversely to the wing axis, being at least three times as long as wide.

The basal segments of the abdomen are moderately enlarged, with marked narrowing on the third segment. Segments 1 and 2 are densely clothed with short stiff hair, and a thin line of hairs extends outward on the lower margins of 3. The auricle on 2 is a short well-rounded ridge with steep sides, its rounded edge and under side being beset with about thirty minute black prickles that are intermixed with stiff hairs. The erect edge of the penis guard is semi-elliptical, very slightly three-lobed on the end.

The anterior hamule is an elongate triangle, with rounded distal end, and just before the end on the posterior margin there is a single long, straight sharp spine. The posterior hamule is a little longer and twice as wide, flat, obliquely placed, bare on the sides but hair fringed on the rear margin. It is ovoid-triangular in form with a short, sharp, beak-like, retrorse tooth on the inner side just before the rounded distal end. The peduncle of the penis is higher than wide, deeply cleft into two erect lobes that are a little aslant forward; single cornu at the tip, about as long as either middle segment, forked at its slender transparent tip.

The genitalia, the most critically distinctive parts in this genus, are most like those of *G. descriptus* Banks in shape and peduncle of the penis, but the anterior hamule is strikingly different.

Holotype: A single fragmentary male specimen that was collected near Argus Brook in the Lloyd Wild-life Reservation near McLain, N. Y., on June 4th, 1923, and that is now (on two slides and in alcohol) in the Cornell University collection.

Gomphus consanguis Selys (supposition). Fig. 2, C and D.

The nymph measures in total length 31 mm.; abdomen 20; hind femur 6; width of head 6; abdomen 9.

This is a flat nymph of the usual Gomphurus form, but with much more than the usual color pattern shown in that group. The general color is pale luteous (possibly greenish in life), patterned with brown. On the top of the head a ring of brown surrounds the middle ocellus, and from it run out faint brown streaks, forward to the base of the antennae and rearward to the rear of the eyes. Lined up across the rear of the head are five brown spots that are more or less connected along the occiput.

The antennae are heavily fringed on each side with long whitish hair. The third antennal segment is almost twice as long as the two basal segments taken together, and the fourth is only a minute subglobular rudiment. The labium is short and stout; mentum parallel-sided beyond the hinge fold, that distal portion being a little wider than long. The median lobe of the mentum occupies about a third of its total width. It is distinctly convex and fringed with the usual scales. The teeth on the inner margin of the lateral lobe are about eight, rather deeply incised, and obliquely truncate on their tips, with the sharp angles directed to rearward. The most distal tooth is adnate to the base of the strong end hook.

On the disc of the prothorax are two dimly-outlined quadrangular areas rimmed with brown. The synthorax is paler,

> with a wash of brown in all its lateral sutures. The hairy legs are darkened on femora and tibiae, and have parallel linear scars and pale knees. A brownish middorsal band of symmetrically patterned mottling covers more than half the width of the dorsum of the abdomen. This band narrows to rearward. In the chocolate brown on each segment there are two submedian apical pale spots, a single large basal spot, and a more diffuse larger lateral spot. The caudal appendages also are mottled with brown.
>
> The burrowing hooks on the fore and middle tibiae are long and strong. The wing cases reach the middle of the 4th abdominal segment. The sides of the abdomen are nearly parallel along the middle segments; most strongly narrowed to rearward on segment 9. There is a middorsal groove on segments 4 to 7. There are minute dorsal hooks on segments 8 and 9, their tips not surpassing the extended intersegmental folds of membrane. The lateral spines are well developed on segments 6 to 9, small, sharp pointed and increasing in size on 7 and 8, smaller again on 9. The sides of the 8th and 9th segments are markedly spinulose serrate.

Known nymphs of two other species of the Gomphurus group have the median lobe of the labium less convex: *adelphus* and *externus*. The former was described by Hagen in 1885.[2] It is smaller in stature (length 29 mm., as compared with 31) and is known only from New York and eastward. The nymph above described is similar to *externus* in size and general appearance, but is easily distinguished by the length of the lateral spines of the 9th abdominal segment (about as long as segment 10, whereas in *externus* they are about two and a half times as long). These spines are also straighter, not being incurved at their tips. Also the teeth on the lateral lobe of the labium are larger, fewer, and more deeply cut in this species, with the end hook longer-pointed.

This description is based on a single well-preserved specimen collected by myself in Cataloochie Creek, North Carolina, in the Great Smoky Mountains National Park on the 4th of April, 1934.

The supposition that this nymph belongs to *G. consanguis* is based on its form, its size, and the fact that it was taken not far from the type locality, Morganton, N. C.[3]

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[2] Hagen, Trans. Amer. Ent. Soc., vol. XII, p. 242, 1885.

[3] Selys, C. R. Ent. Soc. Belg., XXII, p. lxvi, 1879.

Gomphus laurae Williamson (supposition).

The nymph measures in total length 36 mm.; abdomen 21; hind femur 6; width of head 8; of abdomen 10.

This heavily silted nymph is almost without color pattern and it is thinly hairy around all margins. It is greatly depressed, with short femora, wide flat head and wider abdomen. The antennae are set widely apart, with the long third segment strongly decurved in the middle, and the fourth a little cylindric rudiment, hardly as long as the third is wide. The labium is large; its middle hinge reaches backward to the middle coxae. The mentum widens regularly forward to the base of the lateral lobes. The median lobe is low or with only a very slight convexity, fringed with the usual border of flattened scales. The lateral lobe is strongly incurved beyond the base of the stout movable hook; its strong end hook forms a short quarter-circle bend with its point set squarely across the median line. The teeth, deeply set on the inner margin, are very variable, the first and last being ill defined and merging with the inner border. The intermediate teeth vary in number from one to four; they are deeply cut, obliquely truncated on the end with the sharp corner drawn to rearward.

The front and middle tibiae have rather weak burrowing hooks: all femora have the usual sinuous bare lines.

The heavy abdomen is widest on segment 6. The relative lengths of its last four segments is as 8:8:10:2, with the caudal appendages about 7 on the same scale. There are no dorsal hooks (save for the merest vestige of one on 9); there are middorsal grooves on 4 to 7. There are large lateral spines on 6 to 9, on 4 to 6 subequal, their tips slightly incurved; tips of 9 straight and bare, reaching backward almost to the level of the tips of the caudal appendages; the latter, subequal, or the superior and inferiors successively a little shorter. The outer margins of the lateral spines are without serrulations, but they are fringed with long, thin hairs.

I have numerous specimens from the mountain streams of western North Carolina, but only two of them are full grown. Both of these were collected by Dr. James S. Gutsell from the Tuckaseegee River, one on the 19th and one on the 25th of August, 1930. From the same collector I have about a dozen two-thirds-grown nymphs taken on the 4th of October, 1930, from the Catawba River. I have myself collected still smaller nymphs in the Great Smoky Mountain National Park at two places: seven nymphs (the largest, length 17 mm.) from Deep Creek on August 25th, 1931, and two (that Wm. D. Sargent and I took together) from Hazel Creek on the 4th of April, 1934.

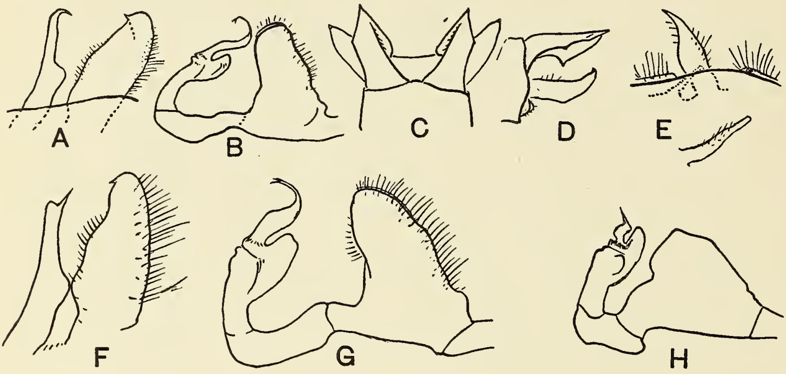

Figure 1. Male Genitalia.

A to *D, Gomphus mortimer* sp. n. *A,* Genital hamules; *B,* Penis; *C,* Caudal appendages in dorsal view; *D,* Same in lateral view.

F and *G, Gomphus argus* sp. n. *F,* Genital hamules; *G,* Penis.

E and *H, Gomphus* (*Stylurus*) *jucundus* sp. n. *E,* Genital hamules; the position of the anterior hamule indicated by the dotted lines; the anterior hamule alone shown below, slightly enlarged. *H,* Penis.

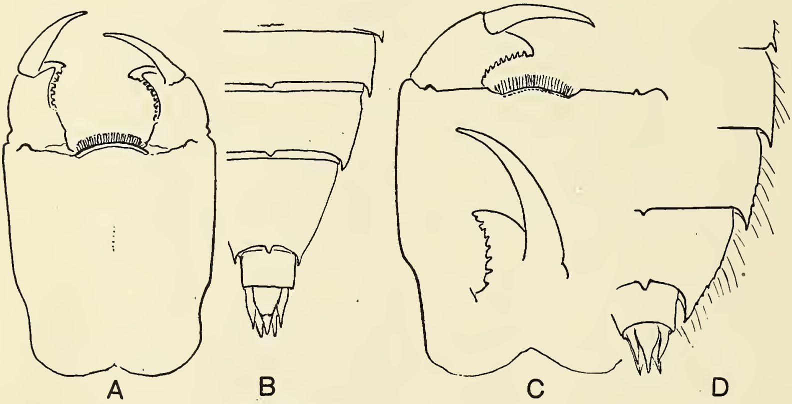

Figure 2. Nymphs.

A and *B, Gomphus mortimer. A,* Mentum of the labium; *B,* End of the abdomen.

C and *D, Gomphus* (*Gomphurus*) *consanguis* (supposition). *C,* Mentum of the labium, with its lateral right lobe detached and more enlarged; *D,* End of abdomen.

A NEW FORM OF HESPERIA LEONARDUS (HARRIS) FROM THE MIDDLE WESTERN UNITED STATES (LEPIDOPTERA, RHOPALOCERA, HESPERIIDAE).

By H. A. Freeman, White Deer, Texas.

Mr. Don B. Stallings of Caldwell, Kansas, called the writer's attention to the fact that specimens of *Hesperia leonardus* (Harris) from Michigan differed from those collected in eastern and more northern localities. This stimulated the writer to make inquiry for and study of as many specimens of *leonardus* as was possible. Dr. G. W. Rawson of Detroit, Michigan, and Mr. W. S. McAlpine of Birmingham, Michigan, supplied a number of fine specimens and remarked that this species was not at all common in Michigan.

After carefully examining over a hundred specimens of *leonardus* from a number of localities in the United States, central and eastern Canada, a number of specimens were picked out from Ohio, Pennsylvania, Michigan, Missouri, Rhode Island, New York and New Jersey that appear to differ sufficiently to warrant a distinct form name. It is with great pleasure that the writer names this new form for Mr. Don B. Stallings of Caldwell, Kansas, one of our most enthusiastic Lepidopterists.

Hesperia leonardus **stallingsi** new form.

This new form differs from typical *leonardus* in the coloration of the spots on the under surface of the secondaries. In typical *leonardus* the spots on the under surface of the secondaries are white or slightly yellowish and contrast sharply with the dark surrounding color. The spots on the under surface of the primaries are ochreous. In *stallingsi* the spots on the under surface of the secondaries are of the same ochreous coloration as those on the under surface of the primaries, therefore not contrasting with the dark surrounding color as sharply as in the typical form. Ninety per cent of the specimens of *leonardus* collected from Ohio to Michigan belong to the form *stallingsi,* suggesting that the term subspecies would better designate this form in middle western localities. Typical *leonardus* occurs commonly in the New England states and in northeastern Canada. Specimens collected in the Thunder Bay Beach region of Ontario are usually characterized by the decided snow-white coloration of the spots on the under surface of the secondaries. Specimens sent to the writer by Dr. A. E. Brower from Augusta, Maine, are all of the typical form and are like specimens from near Boston, Massachusetts (type locality of *leonardus*). Harris in his original description of *leonardus* states that the spots on the under surface of the secondaries are slightly yellowish and this applies to the greater majority of specimens collected in the New England states. The farther south you observe this species the darker the spots are, so actually in its southern range *stallingsi* becomes a distinct racial name. Specimens sent to the writer from Willard, Missouri, by Dr. A. E. Brower well illustrate this point as the spots on the under surface of the secondaries are deep ochreous nearly blending with the dark background.

Described from 35 specimens, 22 ♂♂ and 13 ♀♀. The following 12 specimens were received from Mr. Don B. Stallings, Caldwell, Kansas: 1 ♂, Adamstown, Pa., IX–6–41; 2 ♀♀, Great Bend, Pa., VIII–23–41; 1 ♂, 1 ♀, Hocking Co., Ohio, IX–4–38; 1 ♂, 1 ♀, Allegan, Mich., VIII–38; 1 ♂, 1 ♀, Pittsburgh, Pa., VIII–12–38; 1 ♂, Coram, N. Y., IX–4–31; 1 ♀, Coram, N. Y., IX–5–32; and 1 ♂, Elmwood, R. I., VIII–31–34. The following 11 specimens were received from W. S. McAlpine, Dr. G. W. Rawson and Dr. W. W. Newcomb, all of Michigan: 3 ♂♂, 9-mile road, Oakland Co., Mich., VIII–28–04, W. W. Newcomb; 1 ♂, Blendon, Franklin Co., Ohio, VIII–24–35, G. W. Rawson; 1 ♂, Black Lake, Mich., VIII–11–33, G. W. Rawson; 3 ♂♂, Oakland Co., Mich., VIII–10–10, W. S. McAlpine; and 1 ♂, 2 ♀♀, Franklin Township, Jackson Co., Ohio, IX–4–33, G. W. Rawson. The following 4 specimens were received from Dr. A. E. Brower, Augusta, Maine: 1 ♂, 1 ♀, Willard, Mo., IX–8–18, A. E. Brower; 1 ♂, Willard, Mo., VIII–25, A. E. Brower; and 1 ♀, Pt. Jefferson, L. I., N. Y., IX–16–19, G. P. Engelhardt. The remaining 8 specimens are in the writer's collection and are from the following localities: 2 ♂♂, 1 ♀, New Baltimore, Mich., VIII–24–41, G. W. Rawson; 1 ♂, Columbus, Ohio, VIII–27–35; 1 ♂, Columbus, Ohio, IX–16–35; 1 ♀, Pinckney, Mich., IX–22–40, G. W. Rawson; 1 ♀, Columbus, Ohio, IX–13–35; and 1 ♀, Jamesburg, N. J., IX–4–16.

Holotype ♂, Blendon, Franklin Co., Ohio, VIII–24–35 (G. W. Rawson), and Allotype ♀, Franklin Township, Jackson Co., Ohio, IX–4–33 (G. W. Rawson) and in the writer's collection. Thirty-three *paratypes* will be disposed as follows: 5 ♂♂, 6 ♀♀, to the collection of Stallings and Turner, Caldwell, Kansas; 6 ♂♂, and 1 ♀, to W. S. McAlpine, Dr. G. W. Rawson and Dr. W. W. Newcomb of Michigan; 2 pairs to Dr. A. E. Brower, Augusta, Maine; 1 ♂, to the United States National Museum, Washington, D. C.; 1 ♀, to the American Museum of Natural History, New York, New York; and the other 9 *paratypes* will remain for the present in the collection of the author.

STUDIES ON THE PLECOPTERA OF NORTH AMERICA. IV. FURTHER NOTES ON THE CAPNIIDAE.*

By John F. Hanson, Amherst, Massachusetts.

Frison has recently published several excellent new papers on Plecoptera. I have been prompted, however, by disagreement with some of his conclusions concerning Capniidae, to comment here upon the matter, especially as concerns certain conclusions, expressed in his most recent paper, which are considerably different from mine as expressed in the preceding article (Part III) of this series.

In a discussion (1942a) of his opinions concerning the status of certain species of *Allocapnia,* Frison has attempted to clear up the problem of the identity of *Allocapnia pygmaea* (Burm.) and *Allocapnia nivicola* (Fitch). It appears, however, that further confusion of synonymy may have been the result.

The species which he now considers to be *A. pygmaea* appears not to be the species so considered by Needham and Claassen, who are the only American workers who have critically studied the types of this species. The male of the species which he figures seems to be very closely related to *A. nivicola* while the female resembles *A. pygmaea.* His adoption of Hagen's (1861) synonymy of *A. nivicola* under *A. pygmaea* seems also to be incorrect since, as determined by his own designation of lectotypes of *A. nivicola,* this species is not identical with the one which he considers to be *A. pygmaea* nor with this species as defined by Needham and Claassen.

I have thought it advisable to include here also some further notes on our eastern species of *Capnia* and on *Isocapnia* in the hope of lending additional clarity to recent synonymical designations in these genera.

Allocapnia pygmaea (Burmeister). Figs. 1, 2.

1839. *Semblis pygmaea* Burmeister ♂, Handb. Ent., 2(2): 874.

1925. *Capnella* Needham & Claassen ♂ ♀, Plecop. Amer. North of Mex., pp. 277–278 (redescribed and figured after study of the type).

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* Contribution from the Department of Entomology, Massachusetts State College, Amherst, Massachusetts; financially supported by a Grant-in-Aid from the Society of the Sigma Xi.

1935. *Allocapnia torontonensis* Ricker ♂ ♀, Can. Ent., 67: 257, figs. 14–16 of ♂.

1942. *A pygmaea* in part (♀), Frison, Bull. Ill. Nat. Hist. Survey, 22(2): 265–268, fig. 33 of ♀ (*A. torontonensis* synonymized).

Needham and Claassen (1925) in studying the original cotypes of *Allocapnia pygmaea* (Burm.) which are in the Berlin Zoological Museum found only two males among them. One of these was *Allocapnia recta* (Clsn.); the other they considered to be the type of *pygmaea.* Until this specimen can be critically restudied we obviously must accept the opinion of these workers as to the identity of *pygmaea.* A study either of their monograph or of their identified material in the Cornell collection leaves no doubt as to their conception of *pygmaea.*

A complete study of the Cornell collection shows that out of slightly over 500 specimens labelled as *pygmaea* about 98% are of a single species. The few specimens not of this species consist of several species distributed in three different families. Usually these miscellaneous species were found in vials containing many specimens of *pygmaea.* It is apparent therefore that Claassen did not study every specimen in a given series but was content with identifying only a few and then assuming that the rest were the same. We are forced to this conclusion, since in no other manner could he have placed such widely differing species under a single species label. Thus, it can be stated that the predominating species in any given vial of Cornell material corresponds in all probability with Needham & Claassen's conception of the identity of the species.

There is no doubt that the species treated as *pygmaea* by Needham & Claassen in their monograph is the same as the identity that I have arrived at through a complete restudy of their material. Their key, description, and figures demonstrate several diagnostic features which serve to distinguish it from other species of the genus with which it might be confused. Nevertheless, since their work has been misconstrued, it seems advisable to include detailed figures of the genitalia of both sexes of *pygmaea* (Figs. 1, 2) here, although the figures of Needham & Claassen are reasonably accurate and usable. Specific characters to be noted are: a bilobed median process near the posterior margin of the eighth abdominal tergite of the male; no process present on the seventh tergite; a bulbous knob at the tip of the sheath of the supraanal process; eighth sternite of female with a broad median section expanding apically toward a broad, truncate or slightly arcuate, posterior margin.

As mentioned above, a critical restudy of the type of *pygmaea* in Germany will be necessary for the final settlement of this problem. It is possible that the type of *pygmaea* is conspecific with the lectotype of *nivicola* since Needham & Claassen may have missed the criteria of distinction between the two species. For the present however we must accept the judgment of these workers who are the only ones to have critically studied the genitalia of the type male.

I have studied paratypes of *A. torontonensis* Ricker and agree with Frison in placing this species as a synonym of *pygmaea* although it is not conspecific with the species (*A. nivicola*) that Frison has recently been placing as *pygmaea*.

Allocapnia nivicola (Fitch).

1847. *Perla nivicola* Fitch ♂ ♀, Amer. Jour. Agr. and Sci., 5: 278.
1861. *Capnia pygmaea* in part, Hagen, Syn. Neur. North America, p. 32 (*Perla nivicola* Fitch synonymized).
1942. Hanson, Bull. Brooklyn Ent. Soc., 37: 83–86, figs. 2, 4 of ♂ ♀ (*P. nivicola* removed from synonymy and redescribed).
1942. *A. pygmaea* in part (♂), Frison, Bull. Ill. Nat. Hist. Survey, 22(2): 265–268, fig. 33 of ♂ (selection of lectotype ♂ and synonymy of *A. nivicola* under *A. pygmaea*). *New Synonymy.*

Frison (1942b, p. 266) has shown that the cotypes of *Allocapnia nivicola* (Fitch) deposited in the U. S. National Museum and in the Museum of Comparative Zoology at Cambridge represent several species. He has therefore appropriately selected a male type, which is in the M.C.Z., as lectotype. Since my studies of *nivicola* are based on this same specimen, the selection of it as lectotype by Frison definitely establishes the identity of *nivicola* as the species described in Part III of this series of articles.

In contrast to the diagnostic specific characters mentioned for *A. pygmaea, A. nivicola* may be characterized as follows: (1) a trilobed rather than a bilobed process near the middle of the eighth abdominal tergite of the male; (2) a small transverse process present on the seventh tergite; (3) no bulbous knob at the tip of the sheath of the supraanal process; (4) eighth sternite of female with a strongly chitinized, truncate, median projection. That the correlation of sexes is correct in this case and is not confused with the closely related *A. pygmaea* (Burm.) is certain, since the two species only infrequently occur in the same habitat and I have studied hundreds of specimens of each species. On the basis of the above considerations I again withdraw *A. nivicola* (Fitch) from its recent synonymy under *A. pygmaea* (Burm.) and restore it to the rank of a valid species.

Capnia.

Most of the described species of *Capnia* are confined to North America. Supposedly only one of these, *Capnia opis,* occurs east of the Rocky Mountains. Actually, however, *opis* is not a *Capnia.* Along with another species to be described later as new it belongs in an entirely distinct new genus. A discussion of this new genus will be published in a paper already prepared concerning the comparative morphology of the entire family Capniidae.

The status of the only two eastern species, described in the genus *Capnia, C. opis* and *C. vernalis* is still an open question. In 1938 Ricker published notes on these species after a study of the types in England. As Frison has pointed out (1942b), however, Ricker's comments are a bit inconsistent. He maintains that *opis* is identical with *vernalis* as used by Needham & Claassen and that the types of *vernalis* represent another species. However he figures the genitalia of the male type of the latter species and it is unquestionably the same as what Needham & Claassen considered to be *vernalis.* Therefore, if he is correct in placing *vernalis* as used by Needham & Claassen under *opis,* there remains only one valid eastern species of *Capnia.* This latter view has been adopted by Frison (1942b) and I am inclined to agree with him, but for different reasons. Frison synonymizes *vernalis* under *opis* on the basis of never having found more than one species in all the material he has studied. However, since I find that I have another, distinct, apparently undescribed species in my collection, the synonymy of the above-mentioned species on this basis is precluded. Until the male type of *opis* is prepared for study and accurately figured the best basis for the current usage of this specific name is the short-winged condition of the male reported by Ricker for the type specimen. The several male specimens that I have of the unnamed species are all fully winged while the numerous specimens of *opis* that have been studied nearly always exhibit some extent of brachyptery.

Isocapnia grandis (Banks). Figs. 3, 4, 5.

1907. *Arsapnia grandis* Banks ♂ ♀, Can. Ent., 39: 329.

1925. *Capnia,* Needham & Claassen, Plecop. Amer. North of Mex., pp. 259–260, Plate 48. fig. 6.
1937. *Capnia fumigata* Claassen, Can. Ent., 69: 79, figs. 4, 7. *New Synonymy.*
1938. Banks, Psyche, 45: 73.
1938. *fumosa* Banks, Psyche, 45: 74, fig. 3. *New Synonymy.*
1942. Frison, Pan-Pacific Ent., 18: 69 (♂ cotype selected as lectotype).
1942. *fumigata,* Frison, *ibid.,* pp. 70–71, figs. 12, 15 (*I. fumosa* synonymized under *I. fumigata*). *New Synonymy.*

Isocapnia grandis was described by Banks from a male specimen from Victoria, B. C., and a female from Banff, Alberta. As has been mentioned by Frison, these two specimens, due to their widely separated points of collection, may very well not be conspecific. I am convinced that they are not conspecific (see discussion under *I. integra* n. sp.).

Claassen (1937) has noted and Frison (1942a) has agreed that the males of *fumigata* and *grandis* appear very similar to each other. Claassen states that the supraanal process of *fumigata* is shorter and a little more slender than that of *grandis.* However, the distinction as stated does not exist. In the male types of both species the supraanal processes are identical in length and curvature. In both specimens the supraanal process is a thin curved structure nearly two and one-half times as long as the bulbous base from which it arises. A careful comparison of the male types of both species also shows them to be identical in all other genitalic features as well as in size, coloration, and wing venation. *I. fumigata* (Claassen) must therefore be considered to be synonymous with *I. grandis* (Banks).

The fact that the two female types of *fumosa* and the one of *fumigata* are identical in features of the eighth sternite and were all collected within a radius of fifteen miles of one another is quite conclusive evidence of their conspecificity (Frison, 1942a). The name *I. fumosa* Banks must therefore also be placed as a synonym of *I. grandis* (Banks).

Since the types of *fumigata* consist of a male and two females taken at the same time and place, the correlation of the sexes is most probably correct. Since it is known that the original female type specimen of *I. grandis* is not conspecific with the lectotype male of the species, it is best that the female types of *fumigata* (Claassen) be used as the basis of description of the female sex of *I. grandis* (Fig. 5).

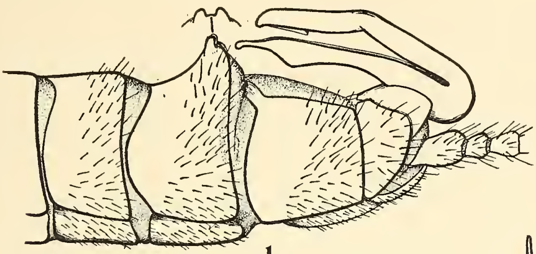
Isocapnia crinita (Needham & Claassen).
1925. *Capnia crinita* N. & Clsn. ♀, Plecop. Amer. North of Mex., pp. 269–270, fig. of wings.
1938. *Isocapnia* Banks, Psyche, 45: 73.
1942. Frison, Pan-Pacific Ent., 18: 69–70, fig. 14a.

In their monograph (1925) Needham & Claassen did not figure the eighth sternite of the monotypic female, nor did they adequately describe it. In a recent paper (1942a) Frison has figured the eighth sternite of this specimen which is in alcohol and is now badly bleached. Its faded condition apparently led Frison to misinterpret the structure and coloration of the eighth sternite. Actually it is identical with that of *I. grandis* in structure (Fig. 5); and if carefully observed, the color pattern, though faded, can be seen to be the same also. It is very probable that this species is a synonym of *I. grandis,* but further collecting of both males and females from the type locality (Bozeman, Montana) or from nearby regions would seem advisable before a definite designation of synonymy is made.

Isocapnia integra n. sp. Fig. 6.
1907. *Arsapnia grandis* Banks in part (♀), Can. Ent., 39: 329.
1942. ? *Isocapnia crinita,* Frison, Pan-Pacific Ent., 18: 70, fig. 14b.

The description of this species is based on two female specimens from Banff, Alberta. One of these is the female type of *I. grandis.* Of the two species of *Isocapnia* described to date the female of only one, *I. grandis,* is known. The latter species is easily distinguishable from *I. integra* by differences in the eighth sternite (see Figs. 5 and 6). In *I. grandis* (Banks) the genital opening is well anterior to the posterior margin of the eighth sternite. In *I. integra* it opens directly on the posterior margin of the segment. The two type specimens of this species are very noticeably smaller than the females of *I. grandis* and are even smaller than the male sex of *grandis.* It is very probable that the female and two male specimens that Frison (1942a, p. 70) assigns to *I. crinita* are referable to *I. integra.*

The only other species with which *I. integra* might possibly be correlated is the recently described *I. abbreviata* Frison. However, the localities of collection of these two species are widely separated and such a correlation would be purely conjectural. Therefore, and since Frison (1942) has selected the original male type of



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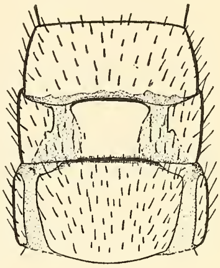

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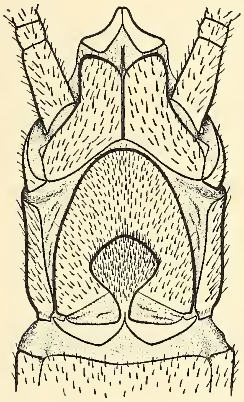

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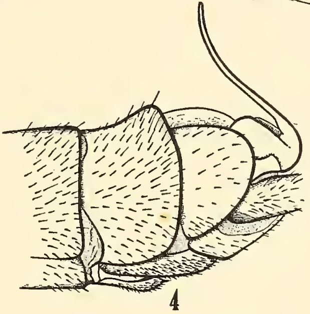

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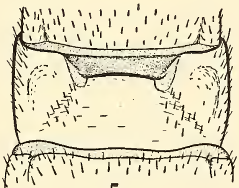

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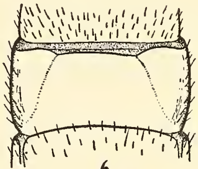

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Explanation of Plate.

Figure 1. *Allocapnia pygmaea* (Burmeister), lateral view of genitalia of male plesiotype.

Figure 2. *Allocapnia pygmaea* (Burmeister), ventral view of genitalia of female plesiotype.

Figure 3. *Isocapnia grandis* (Banks), male genitalia in ventral view.

Figure 4. *Isocapnia grandis* (Banks), male genitalia in lateral view.

Figure 5. *Isocapnia grandis* (Banks), female genitalia in ventral view.

Figure 6. *Isocapnia integra* n. sp., female genitalia in ventral view.

grandis as lectotype, the safest procedure seems to be to describe the female type of *grandis* as a new species.

> *Female:* Length to tip of wings 13 mm.; length of body, 10 mm.; length of fore wing 11 mm.
>
> Eighth sternite glabrous, transverse, slightly convex. With the median third of its posterior margin modified to form a broad and slightly arcuate region (Fig. 6).

All other morphological details of head, thorax, and abdomen are identical to those of the type of the genus, *Isocapnia grandis* (Banks).

COLLECTION DATA: *Holotype* female—"Banff, Alberta, June 17, 1901" (cotype of *I. grandis,* deposited in the Museum of Comparative Zoology in Cambridge). *Paratopotype* female—"Banff, Alberta, June 22, 1908 (J. C. Bradley)" (deposited in the collection of Cornell University at Ithaca). The holotype is a pinned specimen the genitalia of which I have mounted on a slide. The wings of the paratype specimen, which is also mounted on a slide, are missing.

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A novel method of collecting dragonfly nymphs chanced upon during the summer of 1941 may prove of no practical value to collectors but afforded me an amusing evening and helped pass the insufferably hot hours of an unusually hot Arizona night.

While collecting Lepidoptera at night at the Boyce Thompson Arboretum for Plant Research at Superior, Arizona, a gasoline lantern was placed on the dam at the foot of the reservoir. Dragonfly nymphs were noticed swimming in numbers within the circle of light cast on the water and were easily captured with the butterfly net which was lying at hand. It was then found that they could be attracted equally well by an ordinary flashlight directed into the water.

Specimens of *Anax junius, Aeschna multicolor* and *Argia vivida* came in such numbers that I soon tired of the sport and failed to find out if the absence of nymphs of *Enallagma praevarum* and *Ischnura barberi* which were abundant in my sieve net collecting the previous day was significant. The point on the dam where the light was displayed was some 30 feet from the weedy shore where my other collections were made but the walls were covered with the cast skins of all of the species.—Elsie Broughton Klots, Mount Vernon, N. Y.

HISTORICAL NOTE ON NOTIOPSYLLA KERGUELENSIS, AN ANTARCTIC FLEA.

By H. S. Fuller,[1] Cambridge, Mass.

In 1880, Otto Taschenberg (1880a, pp. 67–68, 122, Pl. 2, fig. 12; 1880b, p. 169) described *Pulex kerguelensis* from four specimens (no holotype designated) off a petrel, *Pelecanoides urinatrix,* from Kerguelen Island. These were collected and sent to Ritsema by Rev. A. E. Eaton, on the occasion of the British Transit-of-Venus Expedition in 1874–75. In his account of the natural history of Kerguelen Island, Eaton stated (1875a & b): "A *Pulex* is parasitic upon *Halidroma,* and one (possibly the same species) on *Diomedea fuliginosa.*" In a later report (1879), he noted that, "One of the birds [*Halidroma*] out near Observatory Bay was inconveniently crowded with a species of *Pulex* and *Nirmus setonis* sp. n." "*Nirmus setonis*" is Eaton's rendition of *N. setosus* Giebel, a biting louse.

No additional examples of this flea were recorded until 1895, when Rothschild wrote, "I have to record a fine *male* specimen of *Pulex kerguelensis* Taschb., taken from an example of the parrakeet, *Cyanoramphus unicolor* (Vig.), from Antipodes Island."

Wagner (1898) stated that he could not determine from Taschenberg's description where "*Pulex verguelensis* T." (misspelling) should be placed. But in 1905, Baker (p. 128) erected the genus *Goniopsyllus,* monotypic for *Pulex kerguelensis* Taschenberg. He placed this genus in the subfamily Pulicinae, giving in his key the following generic characters: Legs stout and thickset; female with one antepygidial bristle on either side; head without ctenidia; head above sloping broadly forward, angled in front; segments of abdomen each with five to six rows of bristles. Baker's generic name later proved to be preoccupied (*vide infra*).

Jordan and Rothschild (1909, p. 93, Pl. IV, fig. 2, Pl. VII, fig. 11) discuss the genus *Goniopsyllus,* stating that it is most nearly related to *Hystrichopsylla* Tasch. and *Macropsylla* Roths. They give figures of the fifth mid-tarsal segment and of the ninth abdominal sternite of the male of *G. kerguelensis.* They add, "There are in the British Museum one male and two females of the original four specimens obtained by the Reverend A. E. Eaton off *Pelecanoides urinatrix* on Kerguelen Island during the Transit-of-Venus Expedition. The flea off *Diomedea* mentioned by Eaton, *l.c.,* is apparently not contained in the British Museum's collection. We have one male from Antipodes Island, off *Platycercus unicolor,* collected by Mr. M. Dannefaerd." It is evident that Jordan and Rothschild did not possess the fourth specimen of Taschenberg's original series. However, Oudemans (1909, p. 204) refers to a record "On *Pelecanoides urinatrix* (Gmelin), Kerguelen Island, Roy. Sound, 16 Oct. 1874, A. E. Eaton." Three cotypes are therefore in the British Museum and the fourth is in the Leyden Museum.

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Jordan and Rothschild (1914) point out that the genus *Goniopsyllus* Baker is preoccupied by *Goniopsyllus* Brady 1883, a genus of Crustacea, and replace it with *Notiopsylla* nom. nov., with *kerguelensis* Taschenberg as the type. They retract their former statements concerning its generic relationships, stating that *Notiopsylla* is a very near ally of the genus *Pygiopsylla* Roths., which occurs in Australia, India and Africa. They give ample descriptions of both sexes, including figures of the head of the female and the modified segments of both sexes. They record a male and female from South Georgia off *Prion banksi* and *Larus dominicanus,* obtained by Mr. Robert Cushman Murphy during the South Georgia Expedition of the Brooklyn Institute Museum and the American Museum of Natural History. They note that the collector saw this species of flea in the feathers of freshly killed *Prion,* and also observed them jumping about in the nest burrows of these birds. Schaeffer (1914, p. 90) states that only one specimen was taken off *Larus dominicanus.*

The present writer recently had occasion to study some of the older alcoholic material in the Museum of Comparative Zoology at Harvard. In this collection was a vial containing one flea, labeled in Samuel Henshaw's handwriting, "*Pelecanoides urinatrix,* Kerguelen Is'd., J. H. Kidder, December, 1874." When cleared and mounted, the flea proved to be a female *Notiopsylla kerguelensis,* agreeing closely with the description and figures given by Jordan and Rothschild (1914). There is one receptaculum seminis, and the duct enters the head of the latter near its junction with the tail, as shown in their figure. As this specimen comes from the type locality, it is a topotype, and, moreover, it is from the type host.

The collector, Dr. Kidder, was a member of the American Transit-of-Venus Expedition, 1874–75. English and German scientists were dispatched from their respective countries to observe the transit of Venus across the sun, and it will be recalled that Eaton, the English naturalist, collected the types described by

Taschenberg. The American party including Kidder landed September 10–13, 1874, at the northern end of Royal Sound, a deep indentation in the southern part of Kerguelen Island. They remained on the island until January 11, 1875. An acount of the ornithology and natural history of the expedition is given by Kidder and Coues (1875 and 1876). No fleas are mentioned in the section on insects, or in the discussion of *Pelecanoides urinatrix.* For further information concerning Dr. Kidder, the reader is referred to chapter eighteen of "Ornithologists of the United States Army Medical Corps" by E. E. Hume.

To date, therefore, *Notiopsylla kerguelensis* has been recorded from the following hosts (nomenclature according to Peters[2]) and localities: *Pelecanoides urinatrix* (Gmelin), and *Phoebetria palpebrata* (Forster) (=*Diomedea fuliginosa*), Kerguelen Island; *Cyanoramphus unicolor* (Lear), Antipodes Island; *Pachyptila desolata banksi* A. Smith, and *Larus dominicanus,* Lichtenstein, South Georgia.

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Support Preferences of the Praying Mantis.—An examination of 258 egg-cases of the praying mantis, *Tenodera sinensis,* on the south short of Long Island, reveals some interesting facts about the support-preferences of the female insects. Bayberry twigs led the list, holding seventy-six of the egg-masses. Other supports in order of preference, were: goldenrod, fifty; privet, twenty-nine; sumac, twenty-five; wild cherry, twenty-two; blackberry, twenty; honeysuckle, eighteen; grass stems, three; cat briar, two, miscellaneous, thirteen.—Edwin Way Teale, Baldwin, L. I., N. Y.

A NEW GENUS (TUMEUS) AND SIX NEW SPECIES OF LEAFHOPPERS CLOSELY RELATED TO CLOANTHANUS (HOMOPTERA, CICADELLIDAE).

By Dwight M. DeLong, Department of Zoology and Entomology, Ohio State University.

The *Platymetopius* group of leafhoppers seem to be well represented in the southwestern and Mexican fauna. In recent work upon this material many species have been identified or described in *Cloanthanus,* but a small group treated in this paper do not seem to belong to any described genus. A new Genus, *Tumeus,* is, therefore, being erected to contain *Platymetopius majestus* Ball and *Platymetopius limbatus* Osborn. Also, six other species are described as new at this time.

Genus **Tumeus** nov.

Related to *Cloanthanus* but with a flat, more broadened and bluntly angled vertex with the sides convexly rounded to form a narrow, rounded tip. The face is broader than in *Cloanthanus,* but the angled line just beneath the apex of vertex resembles the markings of the species of that genus. The venation is similar in type to *Cloanthanus,* the costal veinlets are of the same type and the first anteapical cell is usually decidedly shorter than the second anteapical cell. Genotype *Tumeus serrellus* n. sp.

The holotype, allotype and paratype specimens are in the private collection of the author unless otherwise designated.

Tumeus serrellus n. sp.

Resembling *majestus* in form and general appearance but with distinct male genitalia. Length 4.5–5 mm.

Vertex strongly produced and bluntly angled, about one-third longer on middle than basal width between eyes.

Color: Vertex dull yellowish tinged with brown, an elongated, white wedge-shaped spot just back of apex. A pair of proximal longitudinal white stripes bordered with brown lines on either side of median line. Margin white, bordered above and below by a brown line. Face dark brown with an angled, narrow white line just a little below margin. Pronotum dark brown on disc. Scutellum pale brown, central portion mottled with pale. Elytra white subhyaline, veins dark brown, brown vermiculate markings on clavus, disc and apical portions of elytra.

Genitalia: Female last ventral segment sloping from base to form a produced lobe-like posterior margin on the median half of segment. The underlying segment is visible on either side of last ventral segment. Male plates rather short, triangular, bluntly angled at apex. Style with a long, slender, curved, finger-like process arising on inner margin at apex which is almost as long as basal portion. Aedeagus composed of a ventral and a dorsal portion. The ventral portion is long, slender, indented on dorsal side near middle and bearing three short prominent teeth at middle on ventral side. The dorsal portion is sickle-like, with the handle, which is bifid, on the dorsal side and the tip of blade extending caudally.

Holotype male and paratype male from Vergel, Chiapas, Mexico, June 3, 1935 (M.F. 4418) Dampf. Allotype female and paratype male from Tehuacán, Puebla, Mexico, October 17, 1941 (Plummer, Caldwell, Good, DeLong). Paratype female from Iguala, Gro., Mexico, October 25, 1941 (Good, DeLong). Paratype male from Mexico (M.F. 4269) and paratype female from Tlatlaxco, Oax., Mexico, June 22, 1935, collected by Dr. Dampf.

Tumeus majestus (Ball).

Platymetopius majestus Ball, Ent. News, 20: 164, 1909.

A brown species with a pale longitudinal stripe on the middle of vertex. Length 4–4.5 mm.

Vertex produced and bluntly angled almost twice as long on middle as basal width between the eyes.

Color: Vertex pale brown with a median white longitudinal stripe which is narrow at apex, broadened just back of apex and divided by a median dark brown line. Margin white with a brown line just above and the dark face below which is marked by a narrow angular white transverse band a little below marginal band. Pronotum and scutellum pale brown. Elytra brownish subhyaline, veins in anterior portion and costal veinlets dark brown. Apical margins of elytra broadly embrowned.

Genitalia: Male plates rather elongated with apices well rounded. Style with a very short, sharply curved, finger-like process on inner apical portion which is curved sharply outwardly. Aedeagus with a ventral portion which is narrow at base, expanded at middle and deeply notched to form a pair of short proximal teeth, one either side of a deep median notch. Either side of these a deep excavation forms a pair of long slender processes extending far beyond the proximal teeth and curving slightly inwardly. The dorsal process has a single broad caudal portion and a pair of short thick basal processes which are separated.

This species was originally described by Ball from two male specimens collected at Pasadena, California. One of these, collected June 17, 1908, has been kindly loaned for this study by Dr. Oman. The illustration and description have been made from this type specimen.

Tumeus elongatus n. sp.

Resembling *majestus* in form and coloration, but larger with sides of vertex more convexly rounded and costal veinlets different. Length, female 5 mm.

Vertex with sides convexly rounded to form a blunt apex, more than one-third longer on middle than basal width between eyes.

Color: Vertex pale brown with a paler median longitudinal stripe which is broadened a short distance from apex and divided by the darker median line. Margin of vertex pale with a black line bordering it above and dark band below. The face is black with a narrow white band on upper portion next the marginal black band. Pronotum and scutellum dark brown. The elytra brownish subhyaline, apical veinlets dark brown and apical margin broadly brown.

Genitalia: Female last ventral segment broadly, concavely emarginate either side of a small median produced tooth which is notched at middle forming a pair of pointed apical teeth.

Holotype female collected at Guadalajara, Jal., Mexico (Km. 645), October 3, 1941, by C. C. Plummer, E. E. Good, J. S. Caldwell and the author.

Tumeus texanus n. sp.

Resembling *majestus* in form and general appearance but with distinct male genitalia. Length 4.5 mm.

Vertex produced and bluntly angled, almost twice as long on middle as basal width between the eyes.

Color: Vertex pale brown with a pale median stripe which is narrow at apex, but broadened and divided by the median dark line just behind apex. Margin white bordered above and below by a black line. Pronotum dark brown, scutellum pale brown. Elytra pale brown with veins dark brown and with brown markings on clavus and disc, some of which appear to be cross veinlets. Costal veinlets few, but conspicuously brown marked. First anteapical cell and apical margin dark brown. Face brown with an angular white transverse band not far below margin of vertex.

Genitalia: Female last ventral segment sloping from base to a produced posterior margin which is almost truncate, slightly indented either side of a short, blunt, median tooth. Male plates short convexly rounded, apices bluntly angled. Style with apical finger-like process arising on inner margin which is almost as long as the basal portion. Aedeagus consisting of a single process which is broad at base, extending erect, from the middle portion of which a long process extends caudally, is narrowed from a broad base to a slender apex. The apex bears a pair of short slender apical, ventrally directed processes.

Holotype male and allotype female collected at Brownsville, Texas, on the Mexican border May 8, 1935, by Professor J. N. Knull.

Tumeus divisus n. sp.

In general form resembling *majestus* but with different coloration, vertex more convexly rounded before the eyes and with distinct female genitalia. Length, female 4.5 mm.

Vertex twice as long at middle as basal width between the eyes, sides of vertex anterior to eyes strongly convexly rounded to form a narrow, rounded apex.

Color: Vertex dirty white with a large round black spot just back of apex almost reaching lateral margins which is divided at middle by a narrow wedge-shaped white line. A pale reddish brown spot is between eyes at their anterior margins. Pronotum dull greenish. Scutellum yellow, basal angles reddish brown. Elytra pale brownish subhyaline, costal veinlets numerous and dark brown, a brown diagonal stripe from costa across first anteapical cell and apical margin broadly brown. Veins on apical portion dark brown, bordered with pale brown. Face black with a small white spot just a little below apex.

Genitalia: Female last ventral segment sloping from base to posterior margin which occupies the central half of the segment and is twice notched to form a trilobate posterior margin. Portions of the underlying segment are visible at either side of the last ventral segment.

Holotype female collected at Peto, Yucatan, August 9, 1925 (M.F. 604), by Dr. Dampf. This species is very different from any of the other species examined.

Tumeus dilatus n. sp.

In form and general appearance resembling *limbatus* but with more sharply produced vertex, different coloration and distinct male genitalia. Length, male 4 mm.

Vertex strongly produced and sharply angled, twice as long on middle as basal width between the eyes in male.

Color: Dirty white marked with brown, orange and yellow. Vertex with a dusky ring just back of white spot on apex and an orange blotch either side of middle between anterior portion of eyes, margin white either side of middle with a black line above. Pronotum brown. Scutellum with brown basal angles, median portion yellow. Elytra pale subhyaline marked with brownish irrorations. Veins and reflexed veinlets dark brown. A pale arc on apical costal margin and another on the posterior apical cell. Two pairs of round areolar spots on clavus. Face brown with a narrow, angled white transverse marking not far below margin.

Genitalia: Male plates short and broad, apices broad and rounded. The finger-like process at apex of style is broader and longer than in any of the allied species. Aedeagus composed of a ventral pair of long slender processes which extend to apex of pygofer, are pointed at apex and enlarged just before apex by a broad tooth-like structure formed on the ventral margin. The dorsal portion is small, right triangular, concavely excavated on caudal margin and the portion extending dorsally is bifid.

Holotype male collected at Panama City, Canal Zone, March 2, 1921, by J. G. Sanders.

Tumeus latidens n. sp.

In form and general appearance resembling *limbatus* but with darker coloration and distinct male genitalia. Length 4–4.5 mm.

Vertex bluntly angled, sides convexly rounded, almost twice as long at middle as basal width between eyes.

Color: Vertex pale, a dusky area surrounding a white wedge-shaped mark at apex, a broken dull orange band between the anterior margins of the eyes and a brown line either side of middle, parallel to and close to median line. Margin pale, bordered with a black line above and another just beneath. Face dark brown with a narrow, angled, white, transverse mark just below margin. Pronotum mottled with brown. Scutellum paler brownish. Elytra white, heavily marked with dark brown, veins dark brown.

Genitalia: Female last ventral segment with posterior margin slightly shallowly excavated either side of a rounded median tooth which is produced beyond the lateral angles. Male plates short, broad at base, triangular, apices blunt and rounded. Style with a long, stout, finger-like process on inner margin which is almost as long as the basal portion. Aedeagus composed of a ventral and dorsal portion attached at base. The ventral portion is blade-like and in lateral view appears to have a broad, pointed spine-like structure at about two-thirds its length, and the apex is slender, curved ventrally and pointed. The dorsal portion is broad with a long ventral spine-like process directed ventrally and caudally.

Holotype male from Flores, Guatemala, November 11, 1925 (M.F. 792). Allotype female from Vergel, Chiapas, Mexico, May 22, 1935 (M.F. 4259). Both were collected by Dr. Alfons Dampf.

Timeus limbatus (Osborn)

Platymetopius limbatus Osb., Anns. Ent. Soc. Amer., 19: 343, 1926.

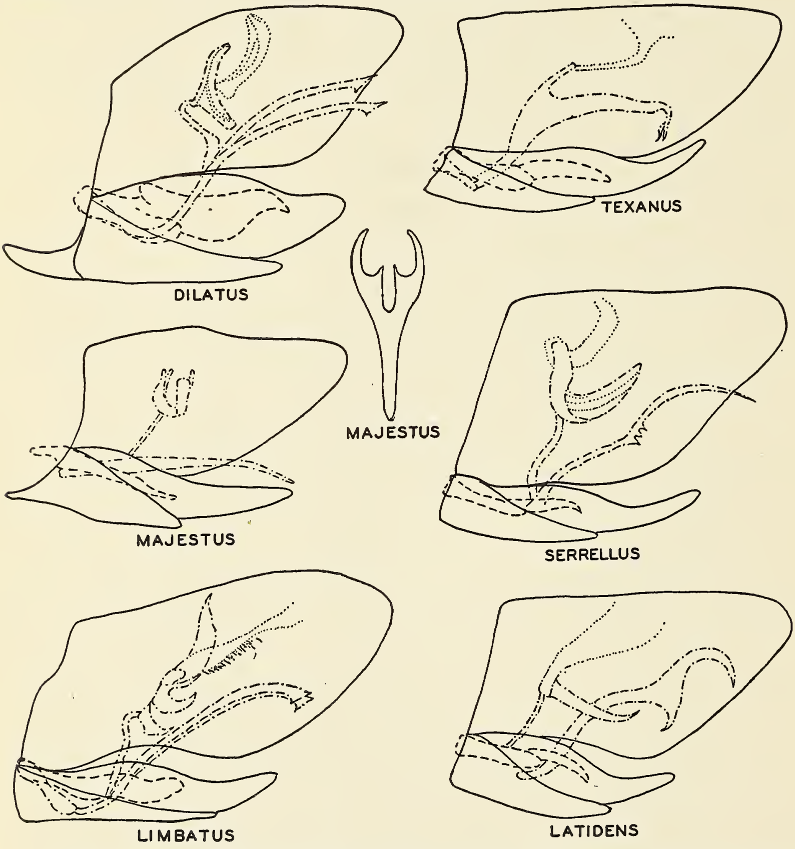
A pale species with banded vertex and mottled elytra. Length 4–4.5 mm.

Vertex produced and bluntly angled, male vertex shorter and blunter than in female. Vertex one-third longer at middle than basal width between eyes in male and more than one-third longer in female.

Color: Cream to yellow, darker coloration varying in intensity. Vertex with a broad curved brownish band just back of apex and a broad broken brown band between the anterior margins of the eyes. A narrow brown longitudinal line parallel to median line and not far from it on either side. Margin pale, bordered above and below by a narrow brown line. Face dark brown with a narrow angled white line just a little below margin. Pronotum pale with disc brown to gray. Basal angles brown, central half paler, often with a pair of small round brown spots on disc. Elytra white subhyaline, clavus marked with brown, anterior half unmarked on basal two-thirds. Veins on apical third dark brown, anterior apical portion marked with dark brown.

Genitalia: Female last ventral segment with posterior margin gradually produced from lateral margins to form a pair of rounded, slightly produced lobes either side of a short narrow median V-shaped notch at middle. The lobes are black marked. Male plates broad, short, scarcely longer than broad, convexly rounded on outer margin, apices broadly rounded. Style with a broad and rather long apical finger-like process arising on inner margin. Aedeagus composed of a pair of rather long slender ventral processes which are enlarged and truncate at apex and a dorsal portion composed of three pieces arranged like the vertebrae of a spinal column.

This species was originally described from specimens collected at Ermita, Cuba, by Prof. Osborn. Specimens are at hand from Plancha, Piedro (M.F. 750), and Flores, Guatemala (Dampf); Tamazunchale, San Luis Potosí, Valles, San Luis Potosí and Iguala, Gro., Mexico (Plummer and DeLong).



Lateral views of male genital structures as labeled except central figure which is the ventral view of aedeagus of *majestus*.

BOOK NOTES.

Biology—The Science of Life, by Mary Stuart McDougall, in collaboration with Robert Hegner. Pp. i–x + 1–963, figs. 1–555. 1943. McGraw-Hill Book Co., New York. $4.00.

Now and again, certain works establish themselves through their merit and outstanding usefulness as standards in their respective disciplines. For many years this has been the position of Hegner's "Zoology."

This is merely a note to draw attention to this new and improved edition of this highly useful and well-designed work, for in the nature of our very brief notices, it is not possible to evaluate critically any work we discuss. In general, in the writer's view, the presentation of the facts is very interesting and logically set forth. They give a co-ordinated insight into the vast field of biology, with its many branches. The fine figures tell their story well and understandably. The text requires no recommendation; its continued use as one of the best of our texts is certain. It is another of the fine contributions of McGraw-Hill to the literature of biology.

General Catalogue of the Hemiptera—Fascicle IV—Fulgoroidea—Part 3, Araeopidae (Delphacidae), by Z. P. Metcalf. Pp. 1–552. 1943. Smith College, Northampton, Mass. $5.00.

Conditions to the contrary notwithstanding, this great work continues to appear as MS presents itself.

A part of the information this Catalogue does not give in so many words is that the work on these insects, the Hemiptera, is so widely scattered and so diffuse that it is not always possible to set genera in their proper sequence. Any idea of doing this for the species is frankly abandoned in this as in other Fascicles. The author openly states that no new system of classification is proposed in it—he merely records published data. While the number of genera included as well as that of species and varieties is not stated, the former exceed 400 in the Araeopidae, and the latter, roughly 2200.

Incidentally, this reviewer believes that when Latinized scientific names are given a vernacular spelling or termination, it might well be so stated: e.g., *Asiraque* is not an "error"; it is a Gallicizing of *Asiraca.* The custom was very prevalent with early 19th-century hemipterists, Amyot & Serville, for example, who gave the French form for all their Latin or Latinized names—*Galostha, Galosthe; Hydrometra, Hydromètre;* etc. This point is well worth attention, since some of the French form of the names are also case-forms in Latin, whence some authors have accepted such names, by interpretation of the principle of priority. Personally, this present writer fails to see the logic of such procedure, because, obviously, the mind of their author envisaged *two* names for one and the same thing; one, the Latin or Latinized scientific form; the other a vernacular spelling for popularizing purposes. However, so long as men act on their subjective notions rather than on objective facts, we shall have to take it as best we can.

All discursiveness apart, the institution, the editors, especially Dr. Parshley; and the author are to be congratulated on producing so important and necessary a work at a time when the thoughts of men seem to be steeped in death and destruction. American entomology is carrying on the high duty of saving our culture and our science.

J. R. T.-B.

Post-mortem "Stings" of the White Flannel Moth.—On August 31, 1943, a male resident of this city rushed into the museum with a jar containing a small piece of white cottony matter, which he claimed had "stung" his mother. According to his account, his mother saw this bit of white fuzz floating around her living room, and, resenting its presence there, made a pass at it and was unfortunate enough to be successful in catching it. For on the instant she did so, the nasty stuff "stung" her on an index finger, which subsequently swelled considerably and was marked with characteristic white-spots. Never previously having had a piece of cotton behave in similar fashion, the family suspected that some "bug," concealed in the material, was responsible for the unprecedented action and brought the bit here for verification and identification. On examination, the object proved to be the dried skin of a caterpillar of the white flannel moth (*Lagoa crispata* Pack.), which was shriveled and dried almost beyond recognition, to the point where it was sufficiently buoyant to be carried by a light current of air. (The caterpillar, which was unusually abundant at the time, possesses stinging-hairs, the irritating qualities of the secretion of which are well known.) During the course of inspection, a single puparium of an undetermined species of tachinid dropped out, making it evident as to what had caused the unusual condition of the skin. To complete the story, it might be pointed out here that the fly imago emerged from its case on September 9, 1943.—Lawrence S. Dillon, Reading Public Museum and Art Gallery, Reading, Pennsylvania.

EDITORIAL

PART versus PORTION.

Editorially speaking, we find that there is no precise usage of the terms *part* and *portion* in papers published in our various entomological journals. These two words are used indifferently to signify a division or a segregated area of a whole. However, the two have different inferential limits. We say correctly "a part of a body," "a part of a country," "a part of a pie." By these we mean an indefinite division of a whole. But when we use "portion," this carries with it an idea of *distribution* or *proportion*. *Part* is a general word, including *portion*. A *portion* is a *part* viewed with reference to a distribution, that is, a *share;* or with reference to some special purpose to which the *part* is to be applied. We say, "the head is a *part* of an animal," but not a *portion;* we say "the forehead is a *part* of the face," but never a *portion;* we say "the face is the front *part* of the head," never "the front *portion*."

In brief, "part" has a very definite underlying meaning; "portion" is a loose and more vague term.

These remarks are a special plea for the consistent use of "part" rather than of "portion." For, in fact, "part" carries with it the idea of an *area* or *segment;* "portion" has a vague connotation, on the side of distribution. For example, "the anterior *part* of the head," could just as well be stated "the anterior *area* of the head." If we say "the anterior portion," we vaguely intimate that there is a sharing process involved. When we say "the western *part* of the United States," we definitely mean the western *area;* we would never think of calling it "*portion*," i.e., *share*. In fact, *portion* is a word that has a more elegant air about it than the humble "*part*," but it is a looser word with another background of correct usage.

So, let us all say consistently "anterior *part*," "hairy *part*," and so on; leaving "portion" to the more elegantly minded literati.

J. R. T.-B.

To Subscribers—Enclosed is your renewal slip. Please use it promptly—Editor.

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A COMPARATIVE MORPHOLOGICAL STUDY OF THE TERMINALIA OF MALE CALYPTERATE CYCLORRHAPHOUS DIPTERA AND THEIR ACALYPTERATE RELATIVES.

BY G. C. CRAMPTON, PH.D., Massachusetts State College,
Amherst, Mass.

In the following discussion, especial attention has been given to the Diptera of medical and veterinary importance, and to those of economic importance as well, since these forms are of more general interest, and are more easily obtainable for study, in case one wishes to verify the evidence here presented by examining the insects themselves.

A comparative morphological study of the terminalia of certain male Diptera which are much less modified than the Calypterate Cyclorrhapha, has also been included in this discussion, in order to present the highly important morphological evidence upon which the interpretation of the terminal abdominal structures of the higher Diptera here discussed, was based, since this interpretation is not the one usually accepted by other investigators—and, in fact, there is no "current" interpretation of the parts in general use among recent students of the Diptera, each of whom appears to have his own views on the subject, differing from those of other investigators in this field.[1] Past experience has shown that the method of comparative

---

[1] Snodgrass, 1935, for example, considers that the forcipate parameres of the lower Diptera represent the "coxites and styli" of male Thysanura, and assigns the sixth sternite to the eighth segment (whose tergite is supposedly represented by the pregenital plate) since he considers that the sixth segment has apparently become obliterated in male Cyclorrhapha. Patton, 1932–1935, and his students, on the other hand, consider that the eighth, rather than the

JUN 8 '44

morphology, involving the study of an ascending series of intergrading lower forms leading to the higher ones, is the most productive of satisfactory results, in attempting to interpret the morphological structures developed in the higher forms such as the Calypterate Cyclorrhapha; and this method is therefore the one adopted here, although the method of comparative morphology is not held in high esteem by many recent investigators, who prefer to reach their conclusions by other lines of reasoning.

The writer is firmly convinced that the modifications exhibited by the male terminalia, which, in the higher Diptera, include features of not less than seven segments of the abdomen (i.e., the fifth to the eleventh, inclusive), are of prime importance, not only for the identification of species, but also for indicating the natural affinities and the family groups to which these Diptera belong. In fact, as is discussed later on, even such a brief study as the present one clearly indicates that some of the accepted family groupings (which are frequently based upon such minor features as the vestiture, etc.) need revising; and if the highly important study of the male terminalia is to add its evidence to that from other sources, for determining the natural affinities of the Diptera, it is evident that some effort should be made to homologize the parts correctly throughout the series of forms to be studied from the standpoint of comparative morphology.

In contrasting the male terminalia of the higher Diptera with those of the lower Diptera, we may note the following differences. The clasping organs of typical male Nematocera are segmented parameres (labeled *bm* and *dm* in Figs. 1 and 2), which work in and out laterally; and the aedeagus is directed more nearly backward in these Diptera, even when the ninth segment (and frequently the eighth also) undergoes a rotary inversion, as is the case in certain Tipulidae, Tanyderidae, Psychodidae, Culicidae, Mycetophilidae, etc., among the Nematocera, and in certain Asilidae, Bombyliidae, Cyrtidae, etc., among the Orthorrhaphous Brachycera. In most Cyclorrhapha, on the other hand (and in some of their near relatives

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sixth, abdominal segment has become obliterated in male Cyclorrhapha (following Awati, 1915, in this matter) and interpret the surstyli and connecting rods as the "coxites and styli" in the higher Diptera, while Cole, 1927, considers that the pregenital plate is formed by the seventh and eighth "tergites," while the sixth sternite supposedly represents the eighth sternite in the higher Diptera according to his interpretation, which is accepted by many recent Dipterists.

among the Orthorrhaphous Brachycera), the clasping organs, which may be formed by the gonapophyses, surstyli and cerci (labeled *a, b, st* and *ce* in Fig. 11) work backward and forward, and the aedeagus, *ae,* is directed forward and downward (instead of posteriorly), due to the more or less complete circumversion of the ninth segment[2] (and the parts behind it) in practically all male Cyclorrhapha. The sixth, seventh and eighth abdominal sternites (labeled *6s, 7s* and *8s* in Fig. 3 to 11, inclusive) may form an oblique series extending up the insect's left side in male Cyclorrhapha; but such an arrangement of the parts does not occur in male Nematocera, or in the lower Brachycera, although a suggestion of this modification is exhibited by such Dolichopodidae as *Argyra* (described by Crampton, 1941); and some Bombyliidae, Cyrtidae, etc., exhibit a tendency toward a torsion of the parts characteristic of most male Cyclorrhapha (as is also the case in the "borderline" families Lonchopteridae and Phoridae).

The stages passed through in the development of the modifications exhibited by the terminalia of the higher Diptera are illustrated by the series of Diptera shown in Figs. 1 to 11, inclusive.

In the Tipulid *Cladura* (Fig. 1), the ninth segment (*9t* and *9s*) is large, and the backwardly-projecting, two-segmented, forcipate parameres (*bm* and *dm*) are large and distinct. The eighth sternite, *8s,* although slightly reduced, remains much larger than the eighth tergite, *8t,* which tends to become vestigial, even in this primitive Nematoceran; and the tendency for the eighth tergite to become vestigial, and eventually to become obliterated, is increasingly apparent as we pass through the series leading to the higher Diptera.

In the Stratiomyid *Ptecticus* (Fig. 2) the ninth segment remains large and well developed (due to the fact that it bears the intromittent organ necessary for the continuation of the species), and is capable of being twisted forward during the copulatory movements, due to the development of the membranous conjunctivae between it and the preceding segments. The distal segments of the forcipate

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[2] The circumversion of the ninth segment results in the looping up of the ejaculatory duct over the top of the hindgut (see Fig. 54), from left to right, in every male Cyclorrhaphan thus far examined (including the Syrphidae and other ancestral Cyclorrhapha), and this looping will doubtless be found to occur in male Bombyliidae, Cyrtidae, Phoridae, Lonchopteridae, and other Orthorrhaphous Brachycera whose lines of descent approach that of the Cyclorrhapha.

parameres, *dm,* become reduced to short flat structures (somewhat suggestive of similar structures occurring in the Syrphid *Syrphus rectus,* described by Crampton, 1941), and the basal segments of the parameres (*bm* of Fig. 2) unite basally with the ninth sternite, *9s,* as they do in the males of many other Diptera.

The eighth tergite, *8t,* remains vestigial in *Ptecticus* (Fig. 2); and the reduction tendency extends forward to include the seventh tergite, *7t,* as well, in the stage of development illustrated by *Ptecticus,* since both tergites have now become reduced to narrow transverse bands, although their corresponding sternites are not so greatly reduced as the tergites are. The seventh and eighth segments thus become differentiated from the preceding segments to form a sort of postabdomen, characteristic of the higher Diptera. In this Stratiomyid (Fig. 2) the eighth sternite, *8s,* is capable of twisting slightly upward into the insect's left side, at least temporarily during mating; and this tendency toward the temporary lateroversion of the eighth sternite (and its ultimate permanent inversion in the higher Diptera) becomes unmistakably apparent as we trace its modifications through the actual ancestral series (i.e., the Cyrtids and their allies) leading to the higher Diptera (Fig. 3) although merely a suggestion of the lateroversion tendency is hinted at in such insects as *Ptecticus* (Fig. 2), which are not in the direct line of descent of the Syrphoid Cyclorrhapha (although some investigators consider that the Syrphidae were derived more or less directly from the Stratiomyidae).

As will be discussed in a later paper dealing with the terminalia of male acalypterate Cyclorrhapha, certain Cyrtidae furnish excellent prototypes foreshadowing the development of the Syrphid and Pipunculid types next to be considered; and in these Cyrtids, the sixth tergite (as well as the seventh and eighth tergites) becomes a narrow transverse band, while the corresponding sternites remain fairly large and well developed, as they are in the Syrphoidea. In these Cyrtids, the seventh and eighth sternites become drawn up, to some extent, into the insect's left side, as the ninth segment becomes inverted, by revolving, from left to right, through 180 degrees, about the long axis of the body; and this rotary inversion of the ninth segment is a preliminary developmental stage, preceding the folding forward of the ninth segment against the insect's right side, which is characteristic of the insects next to be considered.

In the next stage of the series, illustrated by the Syrphid *Heliophilus* shown in Fig. 3, the ninth segment, *9s* (which had apparently previously undergone a preliminary rotational inversion), now becomes folded forward against the insect's right side. Since the ninth segment of *Heliophilus* (Fig. 3) does not thereafter begin a circumversion movement, as it starts to do in the next stage illustrated by the Syrphid *Sericomyia* shown in Fig. 4, the relatively slight movements of the ninth segment do not result in an appreciable traction to cause the eighth sternite to become drawn up into the insect's left side in *Heliophilus* (Fig. 3), so that the large relatively unmodified eighth sternite, *8s,* of Fig. 3, still remains in line with the other sternites, *6s* and *7s,* forming a normal chain of ventrally located sternites, almost exactly like the corresponding sternites, *6s, 7s* and *8s,* of the normally developed Stratiomyid shown in Fig. 2, in which no one would deny that all of these sternites are actually such, instead of representing "displaced tergites," as they are usually interpreted in the higher Diptera. Thus, if comparative morphology has any meaning at all, it is quite evident that it is the *tergites* (and *not* the *sternites*) of the eighth and seventh segments which exhibit an unmistakable tendency to become vestigial or atrophied as we trace their development in the Cyclorrhapha; and the significance of such trends is quite obvious to anyone familiar with the method of comparative morphology for tracing the significance of the modifications later occurring in the higher Diptera derived from ancestors not very different from the forms just described.

As was mentioned above, the initial stages leading to the modifications exhibited by the terminalia of male Cyclorrhapha are: first, a clockwise rotation of the ninth segment about the long axis of the body, through 180 degrees, resulting in the inversion of the ninth segment (with the proctiger); next, a forward-folding of the ninth segment against the insect's right side, as shown in Fig. 3. The ninth segment now begins to execute a "circumversion" movement, which is arrested in various stages of completion in different Syrphidae. Thus, in the Syrphid *Sericomyia,* shown in Fig. 4, the ninth segment has started on a "circumversion" movement and now hangs down ventrally and faces somewhat to the left, instead of facing anteriorly as in Fig. 3. This added twisting around of the inverted ninth segment brings about an increasing pull upon the neighboring eighth sternite, *8s* of Fig. 4, which causes the latter to become drawn still further upward into the insect's left flank. The sixth and seventh sternites, *6s* and *7s* of Fig. 4, likewise tend to follow the lead of the eighth sternite, *8s,* which precedes them in the upward migration into the insect's left side, due to the fact that the eighth sternite is the one next to the gyrating ninth segment, and is consequently the first to be influenced by its traction, and is pulled further upward by its gyrations. As the ninth segment, *9t,* swings still further around in the Syrphid *Paragus* shown in Fig. 6, the eighth sternite, *8s,* is twisted correspondingly further upward into the dorsal region (since there is nowhere else for it to go if the twisting movement continues), where it becomes practically inverted; and the eighth sternite, *8s,* finally becomes completely inverted in the Syrphid *Baccha* shown in Fig. 5, in which the ninth segment, *9t,* has now practically completed its circumversion movement.

It is very significant that the eighth sternite, *8s,* always lags behind the ninth segment, *9t,* in the twisting movements, being but little disturbed when the gyrations of the ninth segment are slight (as in Fig. 3), and becoming inverted only when the ninth segment has practically completed a drastic circumversion movement, as in Figs. 5 and 6, thus indicating that the eighth sternite does not execute a circumversion movement when the ninth segment does, in male Cyclorrhapha. It is also highly significant that the ninth segment is always free of, and separated from, the eighth sternite, as the ninth executes its independent maneuvers (in Figs. 3 to 6) ; and although the ninth segment, *9t,* severs its connections with the eighth sternite, *8s,* the latter always remains in close connection with its preceding fellow sternite, *7s,* and tends to form an increasingly closer union with it (in Figs. 5 and 6), as we would expect it to do, if the plate, *8s,* is a sternite, instead of a tergite.

The above-mentioned Syrphidae are by no means the only lower Cyclorrhapha illustrating with almost diagrammatic clearness the successive stages resulting in the inversion of the eighth sternite (as the oblique upward twist of the sternites follows the gyrations of the ninth segment), since the writer has found excellent illustrations of the torsion of the parts in the lower Pipunculidae (which will be described later in another paper dealing with the lower Cyclorrhapha), and Dr. D. Elmo Hardy has very kindly called the writer's attention to a fine series of male Pipunculidae (or "Dorilaidae") in which the torsion of the terminalia can be traced from such genera as *Chalarus, Prothechus, Nephrocerus* and *Cephalosphaera,* up through *Dorilas* and *Tomosvaryella,* thus demonstrating the torsion of the sternites very conclusively to anyone who is willing to accept the evidence of comparative morphology in this matter. Males of these Pipunculidae, however, are much rarer and more difficult to obtain for study than is the case with the above-mentioned Syrphidae, which will serve equally well for such a study, if one wishes to examine the insects themselves, in order to test the validity of the conclusions here expressed concerning the interpretation of the parts of the terminalia of male Cyclorrhaphous Diptera.

In evident accord with the adumbrational features exhibited by the members of other ancestral groups, the modificational trends exhibited by certain members of the "ancestral" Syrphid series may foreshadow those later developed to a still higher degree in the Cyclorrhapha descended from Syrphid-like ancestors. Thus, for example, in the Syrphid shown in Fig. 6, there is a pronounced tendency for the lateroverted seventh sternite, *7s,* to merge with the inverted eighth sternite, *8s,* to form a single composite pregenital plate;[3] and this tendency is still further intensified in the higher Cyclorrhapha shown in Figs. 9 and 10, until finally in Fig. 11, the two sternites have merged so completely to form a single pregenital plate, that its composite character is revealed only by tracing its development through the preceding series of forms leading up to it. Similarly, the tendency for the sixth sternite, *6s,* to become pronouncedly asymmetrically developed, and to become shifted into the insect's left side, in the higher Cyclorrhapha shown in Figs. 8, 9 and 10, is clearly foreshadowed in the Syrphid shown in Fig. 6.

The modificational trends exhibited by the Syrphid shown in Fig. 5 are still more like those characteristic of the higher Cyclorrhapha shown in Figs. 7 to 11, in that the ninth segment, *9t,* of the Syrphid shown in Fig. 5, undergoes a "complete" circumversion, and becomes hardened or set in this position, as it does in the higher Cyclorrhapha. Similarly, the sixth, seventh and eighth abdominal sternites, *6s, 7s* and *8s,* of Fig. 5, form an oblique series extending up the face of the insect's left flank, as they do in the higher Cyclorrhapha shown in Figs. 9 and 10, etc.; and the sixth abdominal tergite, *6t,* of the Syrphid shown in Fig. 5, is strikingly like the sixth abdominal tergite, *6t,* of the higher Cyclorrhapha shown in Figs. 7 and 10, etc., in form, position and development. In fact, the Syrphid shown in Fig. 5 furnishes an ideal starting point for tracing the modifications occurring in the series of higher Cyclorrhapha shown in Figs. 7 to 11; and it is quite possible that the lines of descent of these Cyclorrhapha arose from similar ancestors in the common Syrphid-Pipunculid ancestral stock.

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[3] The pregenital plate may be referred to as a synurite, or fusion product of two urites (abdominal segments), although it is here interpreted as a synsternite, or fusion product of two sternites, while other investigators interpret it as a syntergite, or fusion product of two tergites.

The "ancestral" character of the key group Syrphidae, in relation to the other members of the Cyclorrhaphous families descended from Syrphid-like ancestors, is indicated by the relatively primitive character of their mouth parts, and their wing venation, in addition to the more primitive condition retained by their terminal abdominal segments, in which, for example, the seventh sternite, *7s,* and the seventh tergite, *7t,* of such a Syrphid as *Sericomyia chrysotoxoides* shown in Fig. 4, remain separate and distinct, and are comparatively normally developed, with normally developed spiracles, etc., unlike the highly specialized condition exhibited by these structures in other Cyclorrhapha (Figs. 7 to 11)—as would naturally be expected in the Syrphids, which occupy a position at the base of the lines of descent of the Cyclorrhapha in general, and furnish the key for interpreting the modifications met with in the higher Cyclorrhapha. The Syrphidae themselves, together with the Pipunculidae and Conopidae, are grouped in the superfamily Syrphoidea, here referred to as the ancestral Syrphoid stock, since the actual ancestors of the Cyclorrhapha (descended from the Cyrtidae) were doubtless sufficiently closely related to the members of the Syrphoidea to be included in the same superfamily with them.

The Ortaloid series (including the Pyrgotidae, Ortalidae, Trypetidae, Richardiidae, Piophilidae, etc.) merges so intimately with the Syrphoid series that it is practically a direct continuation of the Syrphoid series; and the related Helomyzoid series (including the Clusiidae, Helomyzidae, etc.) may have arisen from the same Syrphoid ancestors, since its members have also retained many features suggestive of a Syrphoid origin. The members of the Helomyzoid series have likewise developed certain modificational trends suggestive of those which become more pronounced in the Calypteratae (using this term in the broader, more inclusive sense, without reference to the degree of development of the calypteres in its members), so that the members of the Helomyzoid series may be regarded as morphologically intermediate between the ancestral Syrphoid stock and the Calypteratae, without necessarily implying that the Calypteratae were derived directly from Helomyzoid forebears.

The Clusiid *Clusia lateralis* shown in Fig. 7, and the Helomyzids *Neoleria crassipes* and *Anorostoma marginatum* shown in Figs. 8 and 9, are transitional Helomyzoidea resembling both the ancestral Syrphoids and the lower members of the Calypteratae. These Helomyzoids resemble the Syrphid shown in Fig. 5, in the character of the ninth segment (which undergoes a circumversion in both types of insects), and in the oblique arrangement of the sixth, seventh and eighth sternites; and the sixth tergite of the Helomyzoids shown in Figs. 7 and 8 is very like that of the Syrphid shown in Fig. 5. On the other hand, these Helomyzoids likewise resemble the Anthomyids *Eremomyoides cylindrica* shown in Fig. 10, or *Hylemyia spiniventris* shown in Fig. 23 (both of which belong to a family occupying a position at the base of the Calypterate stem) in the general character of the ninth segment, and in the oblique arrangement of the sixth, seventh and eighth sternites; and the sixth tergite of the Helomyzoid shown in Fig. 7 is very like that of the Anthomyid shown in Fig. 10. By thus making use of the "transitional" stages furnished by the intermediate Helomyzid series illustrated in Figs. 7 to 9, we can readily trace the modifications exhibited by the Calypteratae shown in Figs. 10 and 11, back to their prototypes in the "ancestral" Syrphids shown in Figs. 3 to 6, in which it is a comparatively easy matter to identify the parts of the male terminalia.

Although the Anthomyidae (which occupy a position at the base of the Acalypterate stem) could readily be derived from Helomyzoid precursors in the manner suggested above, a Helomyzoid origin for all of the Calypteratae is not so readily apparent if the Cordyluridae (which are regarded as very primitive Calypteratae by many recent Dipterists) are likewise included in the Calypterate group, since the Cordyluridae appear to lead back to some type of precursors slightly different from those included in the Helomyzoid series.

Such Cordylurids as the one shown in Fig. 17 (*Parallelomma*) or the one shown in Fig. 16, have surstyli, *ss,* very like the surstyli of the Ephydrid *Ochthera mantis,* and a large sixth tergite, *6t,* is retained in these Cordylurids, as is also the case (?) in the Ephydrid *Ephydra millbrae,* figured by Cole, 1927. This, however, does not necessarily imply that the Cordyluridae arose from ancestors related to the Ephydridae, since the Cordyluridae likewise resemble the members of the superfamily Calobatoidea (including the Micropezidae, Calobatidae, Neriidae, etc.) much more closely in the character of their terminal abdominal structures, etc.

Thus, the entire sixth abdominal segment is characteristically large and normally developed in such Calobatoids as those shown in Figs. 14 and 15; and the sixth abdominal tergite, *6t,* is also large and well developed in the Cordylurids shown in Figs. 16 and 17. The large, distinct, lateroverted seventh sternite, *7s* (which is not accompanied by the sixth sternite, *6s,* in its migrations), of the Calobatoids shown in Figs. 14 and 15 is quite suggestive of the type of seventh sternite, *7s,* occurring in the Cordylurids shown in Figs. 16 and 17; and the downwardly-bent ninth segment, with its forwardly-directed aedeagus, *ae,* in the Calobatoids shown in Figs. 14 and 15, is very suggestive of these structures in the Cordylurids shown in Figs. 16 and 17. Furthermore, the fifth sternite tends to send down large, peculiarly-formed ventral processes in both of these groups of Diptera, and the modifications exhibited by the terminalia of male Cordylurids are thus very suggestive of an origin in some Calobatoid ancestry. In fact, if the large sixth tergite, *6t,* of the Calobatoid shown in Fig. 15, (compare also Fig. 14) were to become shifted backward, and the reduction of the sixth sternite, *6s* (already begun in this Calobatoid), were to continue during the backward shifting of the sixth segment, a type of male terminalia extremely like that found in the Cordylurids shown in Figs. 16 and 17 would be produced, thus suggesting that the Cordylurid members of the Calypteratae might have been derived from Calobatoid forebears among the Acalypteratae, although the final solution of the problem of the origin of the Calypteratae, as a whole, must evidently await further study before this problem can be definitely solved.

The Scatophagidae are placed in the family Cordyluridae, among the primitive Calypteratae, by many recent Dipterists; but the terminalia of a typical male Scatophagid, such as the one shown in Fig. 18, for example, do not resemble the terminalia of the Cordylurids shown in Figs. 16 and 17, anywhere nearly as much as they do the terminalia of typical male Anthomyids, such as those shown in Figs. 19 and 10. Thus, the "vertical" sixth tergite, *6t,* of the Scatophagid shown in Fig. 18, resembles the "vertical" sixth tergite, *6t,* of the Anthomyid shown in Fig. 10, rather than the elongated "incumbent" sixth tergite, *6t,* of the Cordylurids shown in Figs. 17 and 16; and the displaced sixth sternite, *6s,* located directly under the vertical pregenital plate, *7s* and *8s,* of the Scatophagid shown in Fig. 18, is much more suggestive of these parts in the Anthomyid shown in Fig. 19, than is the case with the same structures in the Cordylurids shown in Figs. 17 and 16. Similarly, the posteriorly-directed ninth segment, *9t,* and the appendages labeled *st* and *ce* in the Scatophagid shown in Fig. 18, are much more like the posteriorly-directed ninth segment, *9t,* and the appendages, *st* and *ce,* in the Anthomyid shown in Fig. 19, than is the case with the downwardly-directed ninth segment, *9t,* and the peculiar surstyli, *st,* etc., of the Cordylurids shown in Figs. 16 and 17, so that so far as the evidence of male terminalia is concerned, these Scatophagids seem to be more closely related to the Anthomyidae, than to the Cordyluridae.

The Glossinidae, such as *Glossina* sp., shown in Fig. 22, have preserved a large distinct normal sixth tergite, *6t;* and the narrow sixth sternite, *6s,* appears to merge with the vertical pregenital plate, *7s* and *8s,* above it, in a fashion very suggestive of the condition exhibited by the Scatophagid shown in Fig. 18, and the arrangement of the parts is likewise not very different from that exhibited by the Anthomyid shown in Fig. 19. These facts may possibly be taken to indicate that the Glossinidae arose from the common Anthomyid stock, which gave rise to the Scatophagidae as well.

The Anthomyids are among the most primitive representatives of the Calypteratae and form a key group upon which many other Calypterate families converge. They apparently intergrade with the Scatophagidae on the one hand, and with the Muscidae on the other, which might be taken to indicate that all of these forms should be placed in a single family; but since they fall into groups as distinct as those usually regarded as families by the students of the higher Diptera, these groups may be regarded, for convenience, as representing separate "families" of very closely related Calypteratae.

Most Anthomyidae (or Anthomyiidae, as the name is properly spelled) have a deeply cleft fifth sternite, *5s,* with well-developed copulatory lobes, *cl,* as in the Anthomyids shown in Figs. 34, 25, 23, 19, 10, etc.; and the surstyli, *st,* are usually long and slender in typical members of this family (for a description of the surstyli, etc., see the further discussion of these parts under the description of the terminal structures of the Calliphoridae). When the above-mentioned structures are not typically developed in the Anthomyidae (as in Fig. 29), the area belonging to the lateroverted seventh sternite, *7s,* of Fig. 29, is usually large and well demarked in a fashion not found in most members of the other families related to the Anthomyidae. The sixth tergite, *6t,* is usually fairly large and distinct in the Anthomyids, such as those shown in Figs. 10, 23, 26, etc., but when the sixth tergite is not distinct, the sixth sternite, *6s,* may become large and form a stout loop about the posterior border of the cubiculum (or pouch into which the aedeagus is thrust in repose), as is the case of the Anthomyid shown in Figs. 24 and 25.

In the very primitive Anthomyid *Hylemyia spiniventris* shown in Fig. 23 (which is enough different from *Hylemyia antiqua* shown in Fig. 34, to be placed in a different genus, "Protohylemyia") the lateroverted seventh sternite, *7s,* is hugely developed and is distinctly demarked from the eighth sternite, *8s,* by a well-developed cleft and by a distinct, though incomplete suture. In fact, *Hylemyia spiniventris* is so very primitive in the character of its large, well-demarked seventh sternite, *7s* of Fig. 23, that it would have been better to select it, rather than the Anthomyid shown in Fig. 10, for comparison with the similarly modified Helomyzid shown in Fig. 9, but the Anthomyid shown in Fig. 10 exhibits a more marked tendency toward the reduction of the seventh sternite, and is therefore a better intermediate type leading to the stage illustrated in Fig. 11, in which the seventh sternite, *7s,* is practically obliterated.

Although some doubt has been expressed concerning the closest affinities of *Limosia errans,* shown in Fig. 31, its terminalia indicate that it is fairly closely related to such Anthomyids as *Paregle cinerella,* shown in Fig. 28. It is possible that the narrow, anterior, transverse marginal strip along the front border of the pregenital plate, *8s* of Fig. 31, of *Limosia,* may represent the very similar, though distinct, sixth tergite, *6t* of Fig. 28, of *Paregle;* and if this is the case, it would appear that in some cases the sixth tergite may unite with the pregenital plate, instead of becoming atrophied, when the sixth tergite is no longer recognizable as a distinct sclerite.

Fannia canicularis, shown in Fig. 29, is placed in the family Anthomyidae by some Dipterists, while others place it in the family Muscidae. The fifth sternite is not cleft posteriorly in *Fannia* but it lacks the characteristic small posterior processes, *cl,* borne on the hinder margin of the fifth sternite, *5s,* of typical Muscids such as those shown in Figs. 30, 32, 33, etc., and the large, well-demarked seventh sternite, *7s,* is much better developed and extends much further dorsad in *Fannia* (Fig. 29), in a manner more suggestive of the condition exhibited by the Anthomyids shown in Figs. 23, 19, etc., than is the case with the small, poorly demarked area representing the seventh sternite, *7s,* in the typical Muscids shown in Figs. 30, 32, etc. On the other hand, the surstyli, *st,* etc., of *Fannia* (Fig. 29) are not the long slender type of structures that they are in typical Anthomyids, such as those shown in Figs. 24, 28, 34, etc., although the surstyli, *st,* of *Fannia* are very like those of the less typical Anthomyid shown in Fig. 23. The terminalia of *Fannia* might permit the placing of *Fannia* in either of the two families Anthomyidae or Muscidae, but the general evidence seems to be more in favor of regarding it as an Anthomyid than as a Muscid. At any rate, a study of the terminalia of *Fannia* bears out the evidence from other sources that the Anthomyidae are closely connected with the Muscidae (as well as with the Scatophagidae). *Fannia* is likewise of interest in that the area of the pregenital plate belonging to the seventh sternite, *7s,* of this insect (Fig. 29) bears the sinistral spiracle of the sixth segment as well as its own left spiracle, and this may possibly be taken to indicate that the missing sixth tergite has united with the pregenital plate in *Fannia;* but the significance of the location of the sinistral spiracles of this region will be taken up more at length, under the discussion of these spiracles in the Tachinoid series of Calypteratae.

The typical Muscidae exhibit the following characters, which may be of some diagnostic value for determining the closest affinities of certain true Muscidae, such as *Ophyra leucostoma,* etc., which have been wrongly placed in other families by recent Dipterists.

In the typical Muscidae shown in Figs. 30, 32, etc., the fifth sternite, *5s,* is not cleft posteriorly, and the copulatory lobes, *cl,* are reduced to small vestigial processes characteristic of the Muscidae in general. The sixth sternite, *6s,* is asymmetrically developed, and broadens out dorsally, in the upper left hand side, to form a backwardly-bowed, expanded area; and the sixth sternite is situated immediately below the pregenital plate, having been "captured" by the latter. The sixth tergite, *6t,* and the pregenital plate, *7s* and *8s,* may form rather narrow transverse bands; and the area of the pregenital plate which represents the seventh sternite, *7s,* is reduced to a small imperfectly demarked area in the lower left side of the pregenital plate. The cerci, *ce,* and the surstyli, *st,* are short, broad, flattened plate-like structures in most Muscidae, and frequently have been mistaken for divided sternites when they become approximated medianly in the ventral region. In practically all of these diagnostic features, the Muscid *Ophyra leucostoma* shown in Fig. 27 is strikingly like the typical Muscids shown in Figs. 30 and 32, and differs very markedly from the typical Anthomyids shown in Figs. 23, 25, 34, etc., so that on the basis of the evidence furnished by the terminalia, *Ophyra* is a typical Muscid, not an Anthomyid, as it is assumed to be by Dipterists in general.

The terminal abdominal structures of the stablefly *Stomoxys calcitrans,* shown in Fig. 32 (compare also Fig. 33) are so strikingly similar to those of the housefly type shown in Fig. 30, that the evidence furnished by the terminalia is very clearly against the proposal of some recent Dipterists to raise the subfamily Stomoxydinae to family rank, apparently upon such trivial features as the development of piercing mouth parts, etc., in these Muscids; and the modern tendency to split the Cyclorrhapha into a myriad of "families" on the basis of trivial characters, which would at most be considered as merely of subfamily value (or even less) in other insects, has often been commented upon adversely by the more conservative taxonomists. Since the terminalia apparently furnish such extremely valuable evidence for determining the closest affinities of such Muscids as *Ophyra* and *Stomoxys,* etc., for a natural grouping of these flies, it is greatly to be hoped that the highly valuable evidence of the terminalia (which include the parts of at least seven segments) will also be taken into consideration in future attempts to classify these flies more accurately than is possible when such valuable evidence is disregarded.

While the terminalia apparently offer some very valuable clews for placing the Calypteratae in their proper family groups, it must be admitted that the terminal abdominal structures are of relatively little use in attempting to unite the Scatophagidae, Anthomyidae, Muscidae, etc., in a common superfamily Muscoidea (in the restricted sense) as distinguished from the Sarcophagidae, Calliphoridae and other forms sometimes grouped in the superfamily Tachinoidea, since all of these Calypteratae are very closely interrelated, and might be regarded as members of a single superfamily Muscoidea. It may be noted, however, that the sixth sternite, *6s,* of most Scatophagids (Fig. 18), Anthomyids (Figs. 10, 19, 31, etc.) and Muscids (Figs. 27, 30 and 32), lies directly under the pregenital plate, and its upper left hand region broadens out into a characteristically posteriorly-bowed area, while the sixth sternite, *6s,* of most of the other families (Figs. 38, 43, 45, 46, 48, 53, etc.) does not lie quite so directly under the pregenital plate, and is not bowed posteriorly in its upper left-hand region.

The typical Tachinidae shown in Figs. 36, 37 and 38 have a deeply cleft fifth sternite, *5s,* with well-developed copulatory lobes, *cl;* and in front of the pregenital plate, *7s* and *8s,* is a rather wide expanse of membrane which tends to "hump up" in the dorsal region, thereby causing the reduced pregenital plate to be pushed back, and tend to assume a slightly more horizontal position. This dorsal membranous region may contain the sixth tergite *6t* (as in Fig. 37), or the sixth tergite may apparently fade out into the membrane (as it appears to do in Fig. 38) ; and the sixth tergite *6t,* does not seem to unite with the pregenital plate when the latter remains reduced, although it may do so (Fig. 35) when the increasing sclerotization of the pregenital plate causes it to extend forward into the region of the sixth tergite—unless the sixth tergite fades out into the membrane before the pregenital plate encroaches upon its area.

The area of the seventh sternite, *7s,* of the Tachinids shown in

Figs. 36, 37 and 38, is imperfectly defined by a very faint superficial marking, which tends to extend upward into the dorsal region for a short distance, demarking a narrow incomplete marginal area along the anterior border of the pregenital plate. This area apparently corresponds to the anterior marginal region demarked in the pregenital plate, *8s,* of the Calliphorid *Cochliomyia,* shown in Fig. 53, and its appearance suggests that it may possibly be a vestige of the missing seventh tergite, although it seems more probable that it is merely a dorsal extension of the lateroverted seventh sternite, *7s,* if it is not merely a secondarily demarked anterior area of the pregenital plate, having no special significance.

Thelaira nigripes, shown in Fig. 38, is placed in the separate family Dexiidae, by some Dipterists, but *Thelaira* is remarkably similar to the Tachinid *Gonia capitata,* shown in Fig. 36, in which the sixth tergite has likewise become obliterated as in *Thelaira. Thelaira* also resembles the Tachinid *Euphorocera clavipennis,* shown in Fig. 37, which, unlike *Thelaira,* has retained its sixth tergite, *6t,* but in other respects is very like *Thelaira.* If *Thelaira* (Fig. 38), is a typical "Dexiid," and *Gonia* (Fig. 36) and *Euphorocera* (Fig. 37) are typical Tachinids, the differences between the two types of flies are scarcely even of subfamily value, much less of family value; and the evidence of the male terminalia would thus indicate that the so-called "Dexiidae" should be relegated to the status of a subfamily, Dexiinae, of the family Tachinidae.

Phorichaeta (Fig. 40) and *Cylindromyia* (Fig. 35) are usually classed as Tachinids by Dipterists, although they approach the Phasiids shown in Figs. 43 and 44 in the tendency for the curved dorsal area between the fifth tergite, *5t,* and the ninth tergite, *9t,* to become increasingly sclerotized, although it would appear that the increasing sclerotization does not spread from exactly the same centers in both cases, since it would appear that in the Tachinids shown in Figs. 40 and 35, the pregenital plate (bearing the labels *7s* and *8s*) increases at the expense of the area of the sixth tergite, *6t,* while in the more typical Phasiids shown in Figs. 43 and 44, the sclerotization of the sixth tergite, *6t,* likewise appears to increase in size, if the imperfectly demarked area, *6t,* bearing the sixth spiracle in Figs. 43 and 44, represents the sixth tergite. The occurrence of the sixth spiracle in the area in question in Figs. 43 and 44, may possibly be taken to indicate that this area, *6t,* represents the sixth tergite in this instance, but this is not necessarily so, as will be discussed later under the discussion of the occurrence of the spiracles in this region, and the secondarily-acquired symmetry exhibited by them.

The Phasiids *Trichopoda* and *Cistogaster* shown in Figs. 43 and 44, are characterized by the pronounced declivity of the region between the fifth and ninth tergites, *5t* and *9t,* and by the heavy sclerotization of this region, which is demarked into two areas here interpreted as the sixth tergite, *6t,* and the pregenital plate (bearing the labels *7s* and *8s*). The faint line between these two areas is here interpreted as the boundary between the sixth tergite and pregenital plate, because it extends between the spiracles of the sixth segment and seventh segment. These Phasiids resemble the Tachinids shown in Figs. 35 and 40, which serve to connect the Phasiids with the more typical Tachinids shown in Figs. 37 and 36, so that so far as the evidence of the male terminalia is concerned, the Phasiids were apparently descended more or less directly from Tachinid ancestors.

The so-called Megaprosopidae, represented by *Microphthalma disjuncta,* shown in Fig. 41, are too much like such Phasiids as *Cistogaster immaculata,* shown in Fig. 44, to be placed in a family distinct from that containing *Cistogaster.* Exactly the same type of declivitous, highly sclerotized area occurring between the fifth tergite, *6t,* and ninth tergite, *9t,* is found in both insects, and is divided by a faint line into a sixth tergite, *6t,* and a pregenital plate, *7s* and *8s,* in both insects; and the other differences are hardly of subfamily value, so that it is preferable to relegate the so-called family group Megaprosopidae to the rank of a subfamily of the Phasiidae, if the already sufficiently numerous "families" of Cyclorrhapha are to be kept within reasonable bounds.

The Gasterophilid *Gasterophilus intestinalis,* shown in Fig. 39, is sufficiently different from the other forms here described to warrant placing it in an entirely distinct family, the Gasterophilidae; and it appears to be as closely related to the Tachinoidea as any other group of flies here figured, although it has been placed in the family Muscidae by some recent Dipterists, while others place it in the Acalypterate group with the Sepsids, etc. The terminalia of *Gasterophilus* (Fig. 39) are clearly too different from those of typical Muscids (Figs. 30, 32, etc.) to warrant placing it in the family Muscidae, and the terminal structures of *Gasterophilus* (Fig. 39) are as much like those of the Tachinid *Cylindromyia binotata* (shown in Fig. 35) as any of the insects here described. There is no distinct sixth tergite or sternite in either of the insects shown in Figs. 39 and 35, and the pregenital plate, *7s* and *8s,* is rather declivitous in both, while the ninth tergite, *9t,* has a "bulging" contour in both insects, and the cerci, *ce,* and surstyli, *st,* are quite similar in both of these flies. Judging from the character of the terminalia, it is possible that the Gasterophilidae were descended from Tachinoid forebears somewhat like the Tachinid shown in Fig. 35; and the fact that the Tachinids tend to be parasitic would lend weight to the view that the parasitic Gasterophilids were possibly descended from Tachinoid forebears.

The cuterebrid *Cuterebra americana* (or *Atrypoderma americana* as it is called by recent Dipterists) shown in Fig. 42, resembles the Phasiid *Trichopoda pennipes,* shown in Fig. 43, in that the fifth sternite, *5s,* is not cleft posteriorly in either insect; and the pregenital plate is sharply declivitous in both of these flies, and these resemblances may possibly indicate that the Cuterebrids were descended from ancestors rather closely related to the Phasiidae.

It should be noted, however, that the pregenital plate, labeled *7s* and *8s* in Fig. 42 of *Cuterebra,* differs somewhat from the pregenital plate, labeled *6t, 7s* and *8s* in the Phasiid shown in Fig. 43, as is indicated by the location of its transverse sutures with relation to the position of the neighboring spiracles. In the Cuterebrid shown in Fig. 42, for example, the sixth spiracle is *not* borne in the pregenital plate as it is in Fig. 43; and this might possibly indicate that the sixth tergite has become atrophied in Fig. 42, instead of becoming large and uniting with the pregenital plate as it appears to do in Fig. 43, in which the area of the sixth tergite, *6t,* is demarked by an incomplete transverse suture (and faint impressed line) extending across the pregenital plate between the sixth and seventh spiracles, and lying *in front of* the seventh spiracle. In Fig. 42, on the other hand, the transverse suture extends *behind* the seventh spiracle, and this may indicate that the areas labeled *7s* and *8s* in Fig. 42 correspond only to the area labeled *7s* and *8s* in Fig. 43, in which a surface marking (indicated by a dotted line) extends across the pregenital plate in front of the seventh spiracle. The slight difference in the composition of the pregenital plate, however, would not necessarily preclude deriving the Cuterebrids and Phasiids from a common ancestry, and might merely indicate that both groups were possibly derived from Tachinoid ancestors (resembling the Tachinid shown in Fig. 37 to some extent).

The pregenital plate, labeled *6t, 7s* and *8s* in the Phasiid shown in Fig. 43, exhibits a *secondarily*-acquired bilateral symmetry (even with respect to the occurrence of the sixth and seventh spiracles on both sides of the body), which results in a deceptive masking of the torsion of the parts, externally. By tracing the modifications of the pregenital plate of the Phasiid shown in Fig. 43 back to its prototype in the Tachinid shown in Fig. 37, and through this Tachinid to the type of pregenital plate occurring in the ancestral Anthomyid shown in Fig. 23, we may logically conclude, however, that the terminalia of the Phasiid shown in Fig. 43 underwent a previous torsion of the parts before they finally acquired a secondary symmetry, as the end-result of the parts accommodating themselves to each other, as they settled down in their final adjustment, and became more or less rigidly set, after acquiring a *secondary* external symmetry.

Although the occurrence of the sixth and seventh spiracles in or near the pregenital plate may be of some significance for indicating the components of the pregenital plate in some cases, too much weight cannot be given to the occurrence of these spiracles, as is shown in the following instances.

In the Phasiid shown in Fig. 44, the sixth spiracle enters the enlarged sclerite forming the pregenital plate (labeled *6t, 7s* and *8s*) when the sixth tergite, *6t,* combines with the enlarged pregenital plate; but in Fig. 41, the sixth spiracle does not enter the pregenital plate, when the sixth tergite, *6t,* combines with it. In Fig. 50, on the other hand, the sixth spiracle enters the pregenital plate despite the fact that the sixth tergite, *6t,* remains distinct from the pregenital plate; and in such instances as these, the comparative morphology of the sclerites furnishes a better guide than the occurrence of the spiracles, for determining the composition of the pregenital plate.

It may also be noted that in the Tachinid shown in Fig. 35 both the sixth and the seventh spiracles are borne in the enlarged pregenital plate, labeled *7s* and *8s* (compare also Figs. 7, 29, 44 and 50), while in the Tachinid shown in Fig. 38, on the other hand, both of these spiracles lie in the membrane in front of the pregenital plate (compare also Figs. 9, 13, 33, etc.), and still another condition is exhibited by the spiracles in the Tachinid shown in Fig. 36, in which the seventh spiracle is borne in the pregenital plate, while the sixth spiracle lies in the membrane in front of the pregenital plate—as is also the case in most of the Diptera here discussed (e.g., Figs. 42, 23, etc.).

From the foregoing discussion, it is evident that the occurrence of the sixth spiracle in the enlarged pregenital plate really indicates that the sixth tergite also enters into the composition of the pregenital plate only when the comparative morphology of the parts likewise confirms it (as in Figs. 43 and 44), for the sixth spiracle may enter the pregenital plate while the sixth tergite lags behind (as in Fig. 50), or the sixth tergite may even combine with the pregenital plate while the sixth spiracle lags behind (as in Fig. 41); and all possible combinations of the occurrence of the sixth and seventh spiracles with reference to the pregenital plate are found in the Tachinids shown in Figs. 35, 36 and 38, so that in this case, as in most other instances as well, the comparative morphology of the sclerites is the only safe guide for interpreting the parts of the male terminalia.

It is rather difficult to characterize the Sarcophagidae on the basis of their terminalia; and the terminal abdominal structures do not furnish many features of value for definitely determining the closest affinities of the Sarcophagids.

Sarcophagids such as the one shown in Fig 20 (compare also Fig. 45) have an elongated horizontal pregenital plate (labeled *7s* and *8s*) in which the sinistral seventh spiracle is borne far back toward the middle of the pregenital plate, thus suggesting that the seventh sternite, *7s,* forms a large portion of the pregenital plate, as it likewise appears to do in the Cordylurids shown in Figs. 17 and 16; but in the Sarcophagid shown in Fig. 47, the pregenital plate is more vertical, and is not so greatly elongated as it is in the other Sarcophagids here figured.

The Sarcophagids differ from many other Calypterate families in having the surstyli, *st* of Figs. 45 and 47, reduced and situated under the ventral border of the ninth tergite, *9t,* resembling such Tachinids as the one shown in Fig. 36, in this respect. Sarcophagids such as the one shown in Fig. 20 likewise resemble such Tachinids as the one shown in Fig. 36 in exhibiting a tendency for the membranous region in front of the pregenital plate, *7s* and *8s,* to become enlarged and bulging dorsally, and for the sixth tergite to become obliterated in this region. Sarcophagids such as the one shown in Fig. 45, on the other hand, resemble Calliphorids, such as the one shown in Fig. 46, in the general appearance of the ninth tergite, and other features as well; but the resemblances are not very striking, and the closest affinities of the Sarcophagids are rather obscure.

In typical Calliphorids, such as those shown in Figs. 48 to 53, the fifth sternite, *5s,* is cleft posteriorly—as is also the case in many other Calypteratae. The sixth tergite, *6t,* is usually well developed in the Calliphoridae, and tends to extend over the pregenital plate, *7s* and *8s,* which forms an angle with it in such Calliphorids as those shown in Figs. 48 and 53, in which the angle thus formed causes the terminalia to bulge out in the dorsal region.

The surstyli, *st,* of the Calliphorids are pointed structures, suggestive of those of the Anthomyids, particularly in the Calliphorid shown in Fig. 46, in which the surstyli, *st,* are long and slender, and the parts of the terminalia are very like those of the Anthomyid shown in Fig. 28. In the form and position of its surstyli, *st,* and in the general appearance of the ninth tergite, *9t,* the Calliphorid shown in Fig. 46, likewise resembles the Sarcophagid shown in Fig. 45.

Many Dipterists consider that the Calliphorids are so closely related to the Muscids that they place the Calliphorids in a subfamily, Calliphorinae, of the family Muscidae; but the terminalia of male Calliphorids apparently point to a somewhat closer relationship to the Anthomyids, from which the Muscids arose. Typical Calliphorids, such as those shown in Figs. 48 to 53, differ from the typical Muscids shown in Figs. 30 and 32, in the following respects. The fifth sternite, *5s,* is cleft posteriorly, and the sixth sternite, *6s,* is not bowed posteriorly in its upper left-hand region in the Calliphorids (Figs. 48 to 53), while in the Muscids shown in Figs. 30 and 32, the fifth sternite, *5s,* is not cleft posteriorly, and the sixth sternite, *6s,* is bowed posteriorly in its upper left-hand region. The cerci, *ce,* and surstyli, *st,* of the Calliphorids (Figs. 38 to 53) are slender, and taper to a point distally, while in the Muscids shown in Figs. 30 and 32, the cerci, *ce,* and surstyli, *st,* tend to become broad and flat, and do not taper distally. In these features the Calliphorids appear to be somewhat closer to the Anthomyidae than they are to the Muscidae, and also resemble the Sarcophagidae and Tachinidae in them. In fact, the lines of descent of the Muscidae, Anthomyidae, Calliphoridae, Sarcophagidae and Tachinidae all intergrade so intimately that it is extremely difficult to determine whether the Calliphoridae and Sarcophagidae should be grouped in the superfamily Muscoidea (in the restricted sense) or in the superfamily Tachinoidea (or "Larvaeovoroidea"), and the writer's former suggestion (Crampton, 1942, p. 118) to place the Calliphoridae and Sarcophagidae in the superfamily "Larvaeovoroidea" is admittedly open to some objection from this standpoint.

The principal external features of the terminalia of typical male Calypterate Cyclorrhapha are illustrated fairly well by the Calliphorid *Phormia regina* shown in Fig. 11 (compare also Fig. 34), while the details of the internal structures in the neighborhood of the aedeagus are illustrated by the Calliphorids shown in Figs. 49, 52 and 54.

As is shown in Figs. 11 and 34, the fifth abdominal segment is usually the last segment of the preabdomen in male Calypteratae. In the preabdomen of male Calypteratae, the spiracles are usually (though not always) borne in the ventro-lateral region of the tergites, while in the preabdomen of male Acalypteratae they are usually located in the lateral membrane below the tergites. In the postabdomen of male Cyclorrhapha in general, the sinistral sixth spiracle is usually located in the lateral membrane, and the sinistral seventh spiracle is usually borne in the pregenital plate, although exceptions to this rule have already been pointed out.

The fifth sternite is frequently cleft posteriorly in male Calypteratae (but only rarely in male Acalypteratae), and the copulatory lobes which it bears usually project posteriorly below the aedeagus, as far back as the bases of the cerci. The aedeagus, *ae* of Figs. 52 and 17, is usually thrust forward into a genital pouch, or cubiculum, *cu,* for protection, in repose.

The slender sixth sternite, *6s* of Figs. 24, 34 and 52, which is frequently asymmetrically developed, loops downward around the opening of the cubiculum, *cu* of Fig. 52, to support its membranous walls; and the roof of the cubiculum is supported by the hypandrial apodeme, *ha* of Figs. 52 and 49, which is formed by an inflexion of the ninth sternite, *9s* of Fig. 49. Above the hypandrial apodeme, *ha* of Figs. 52, 54 and 49, lies the aedeagal apodeme, *aa,* which is attached to the intermediate plate (labeled *i* in Fig. 49) located at the base of the aedeagus, *ba;* and this intermediate plate lies between the bases of the anterior gonapophyses, or pregonites, labeled *a* in Figs. 49, 54, etc. The muscles attached to the aedeagal apodeme aid in retracting the aedeagus.

On each side of the aedeagus, *ae,* lie the paired pregonites and postgonites, *a* and *b* of Figs. 49, 54, 34, etc., commonly called the anterior and posterior gonapophyses. The latter terms, however, are likewise applied to the anterior and posterior valves of the ovipositor in Orthopteroid insects, which are not homologous with the anterior and posterior gonapophyses of male Cyclorrhapha; and in order to avoid the confusion attendant upon applying the same terms to two wholly different sets of structures, it is preferable to designate the so-called anterior and posterior gonapophyses of male Diptera as the pregonites and postgonites (*a* and *b* of Figs. 49, 54, 34, 11, etc.). These "gonites" of male Cyclorrhapha may be homologous with somewhat similar structures occurring in the males of such lower Brachycera as the Stratiomyidae, Therevidae, etc., or the gonites may be structures more or less peculiar to male Cyclorrhapha, and develop to aid in holding the parts together in mating (by fitting into certain pockets in the female terminalia) as the forcipate claspers (or parameres) of the lower Diptera become atrophied, or are unrecognizably transformed.

The aedeagus, *ae,* of many Calliphorids, etc., is subdivided into two regions called the basaedeagus, and the distaedeagus, labeled *ba* and *da* in Figs. 49 and 54. A genital spine, called the gonacanthus or epiphallus, *c,* projects from the basal portion of the aedeagus, *ba,* in Figs. 34 and 54; and in many Calliphorids, the distal portion of the aedeagus bears processes called the hypophallus, paraphallus and acrophallus (labeled *hp, pp* and *ap* in Fig. 54), most of these terms being taken from Lowne's monumental work on the blowfly *Calliphora erythrocephala.*

Paired sperm ducts conduct the spermatozoa from the testes, *ts* of Fig. 54, to the common duct, which also receives the products of the paragonia, *pa,* whose thickened secretions, according to Lowne (1893–95), serve to bind together the spermatozoa, when they are discharged through the ejaculatory duct, *ed,* by the action of the sperm syringe, or ejaculator, *sp.* An ejaculatory sclerite, embedded in the walls of the ejaculator, *sp* of Fig. 54, furnishes attachment for the circular muscles extending around the syringe; and the contraction of these muscles serves to drive the semen through the ejaculatory duct, and out of the aedeagus, in copula. Apparently, the ejaculatory duct, *ed* of Fig. 54 (or the continuation of the common sperm duct), loops up from left to right over the top of the hindgut in all male Cyclorrhapha (including the Syrphoidea), and it is probable that a similar condition will be found to exist in the males of the Orthorrhaphous Brachycera, such as the Bombyliidae, Cyrtidae, Phoridae, Lonchopteridae, etc., which approach the ancestral Syrphoid stock of the Cyclorrhapha.

In male Calypteratae, the external evidence of the clockwise torsion of the terminalia is largely restricted to the oblique arrangement of the asymmetrical sixth, lateroverted seventh, and inverted eighth abdominal sternites, *6s, 7s* and *8s,* occurring in such primitive Anthomyids as the ones shown in Figs. 23, 10, 19, etc. (compare also Fig. 9), although the ninth segment, which undergoes a still more violent twist or circumversion, does not present any visible external evidence of the torsion it undergoes before coming to rest in its final position. In many higher Calypteratae, the extent of the former oblique twist of the segments preceding the ninth is later concealed when the reduced lateroverted seventh sternite merges with the inverted eighth sternite to form the composite pregenital plate, which eventually assumes a symmetrical appearance even in the arrangement of the spiracles it bears, although it is not symmetrical in such primitive Calypteratae as the ancestral Anthomyids shown in Figs. 23, 10, etc.

The appendages, *st,* of the ninth tergite, *9t,* of the Calliphorids shown in Figs. 54, 52, 51, etc., are called the surstyli or edita. Together with the cerci, *ce,* they serve to aid in holding the parts of the female in mating, or, extending forward below the aedeagus, they likewise serve to protect this delicate organ when it is thrust into the cubiculum in repose. The connecting rods, *cr* of Fig. 49, extending backward from the posterior region of the ninth sternite, *9s,* to the bases of the surstyli, *st,* cause them to become flexed when the muscles attached to the hypandrial apodeme, *ha,* draw the ninth sternite forward. The surstyli have been interpreted as parts of the modified genital forceps of the lower Diptera by some investigators, but are tergal structures borne on the ninth tergite, *9t,* while the genital forceps are sternal structures borne on the ninth sternite, and the two different types of structures cannot be homologous.

The cerci, *ce,* are the modified limbs of the eleventh segment, which unites with the tenth segment to form the proctiger, or anus-bearing segmental complex, *pg* of Figs. 54 and 52. The cercus-bearing eleventh segment unites with the tenth segment in male Mecoptera, which are very like the ancestors of the Diptera; and in many male Orthopteroid insects, which are like the ancestors of the Holometabola in general, the cercus-bearing eleventh segment unites with the tenth segment, so that it is not at all surprising that the same thing has occurred in male Diptera, although some investigators do not consider that the cerci of male Diptera are actually such, since they appear to be borne on the tenth "segment," which, however, is a composite "segment" composed of the united tenth and cercus-bearing eleventh segments, as is also the case in the above-mentioned male Mecoptera and Orthopteroid insects. In some Calypteratae the cerci unite ventrally to form a single plate or zygocerci; but they are usually distinct in most male Cyclorrhapha.

The cerci bear sensory organs, and, together with the surstyli, may serve as accessory clasping organs in copulation. The cerci and surstyli usually operate together, and have even been interpreted as parts of the same structure, although the cerci are appendages of the eleventh segment (embryologically), while the surstyli are processes of the ninth tergite. The cerci and surstyli usually extend forward under the aedeagus in repose (when the latter is thrust into the cubiculum), and the copulatory lobes of the fifth sternite extend backward beneath them only as far as the bases of the cerci, to leave the anal opening free at all times for the unimpeded discharge of the faeces.

The grouping of the families of the Calypteratae suggested by the study of the male terminalia may be briefly indicated by dividing the Calypteratae (or Muscamorpha as they may be called) into two principal superfamilies—to which two other minor superfamilies might possibly be added.

The first main superfamily, the Muscoidea (in the restricted sense), contains the families Scatophagidae, Glossinidae (of doubtful affinities), Anthomyiidae, and Muscidae. The Sarcophagidae and Calliphoridae are also grouped in this superfamily by some Dipterists, such as Townsend, but the writer is inclined to group these two families in the Tachinoidea (or "Larvaeovoroidea"), although the ultimate disposal of the Sarcophagidae and Calliphoridae cannot be definitely determined in the present state of our knowledge.

If the Cordyluridae are to be regarded as true Muscomorpha, or Calypteratae, as most modern Dipterists maintain, it might be advisable to place them in a separate superfamily, the Cordyluroidea. Their terminal abdominal structures, at any rate, would indicate that they are sufficiently different from the Muscidae to be placed in a distinct family, although Curran (1934, North American Diptera) places them in the family Muscidae.

The second main superfamily, the Tachinoidea (or Larvaeovoroidea), includes the Tachinidae and Phasiidae, with which the Sarcophagidae and Calliphoridae might eventually be grouped, but for the present, it is preferable to suspend judgment concerning the closest affinities of the Sarcophagidae and Calliphoridae.

The Gasterophilidae and Cuterebridae resemble the Tachinidae very closely, and might be grouped in the superfamily Tachinoidea, although the genitalic differences might be considered sufficient to place them in a separate Oestroid superfamily.

From the foregoing discussion, it is evident that the study of the male terminalia is of considerable value for placing an insect in its proper family, and in some instances, it is also of value for grouping the families into superfamilies. Evidence of this type, however, has been much neglected by recent students of the Diptera, and it is greatly to be hoped that more attention will be given to this promising field when the present distractions of totalitarian war are past, and the younger Dipterists are free once more to devote their thoughts and energies to the solving of problems such as these!

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ABBREVIATIONS.

a	pregonite (anterior gonapophysis)
aa	aedeagal apodeme
ae	aedeagus
ap	acrophallus
b	postgonite (posterior gonapophysis)
ba	basaedeagus
bm	basimere or basistyle (basal segment of paramere)
c	epiphallus or gonacanthus
ce	cerci
cl	copulatory lobes of fifth sternite (copulalobi)
cl	jugobaculi or connecting rods
cu	cubiculum or genital pouch

da	distaedeagus
dm	distimere or dististyle (distal segment of paramere)
ha	hypandrial apodeme
hp	hypophallus
i	intergonite or intermediate plate of gonites
pa	paragonia
pg	proctiger
pp	paraphallus
s	sternite (written after Arabic numeral denoting abdominal segment)
sp	sperm syringe or ejaculator
st	surstyli or edita
t	tergite (written after Arabic numeral denoting abdominal segment)
ts	testis

EXPLANATION OF FIGURES.

Unless otherwise stated, all figures are lateral views of the male terminalia viewed from the insect's left side.

Fig. 1. A Tipulid, *Cladura flavoferruginea.*
Fig. 2. A Stratiomyid, *Ptecticus* sp.
Fig. 3. A Syrphid, *Heliophilus chaligosa.*
Fig. 4. A Syrphid, *Sericomyia chrysotoxoides.*
Fig. 5. A Syrphid, *Baccha cognata.*
Fig. 6. A Syrphid, *Paragus bicolor.*
Fig. 7. A Clusiid, *Clusia lateralis.*
Fig. 8. A Helomyzid, *Neoleria crassipes.*
Fig. 9. A Helomyzid, *Anorostoma marginata.*
Fig. 10. An Anthomyiid, *Eremomyoides cylindrica.*
Fig. 11. A Calliphorid, *Phormia regina.*
Fig. 12. A Neriid, *Glyphidops filosus.*
Fig. 13. A Calobatid, *Mimegralla* sp.
Fig. 14. A Calobatid, *Calobata pallipes.*
Fig. 15. A Micropezid, *Micropeza* sp.
Fig. 16. A Cordylurid, *Parallelomma* sp. No. 1.
Fig. 17. A Cordylurid, *Parallelomma* sp. No. 2.
Fig. 18. A Scatophagid, *Scatophaga stercoraria.*
Fig. 19. An Anthomyiid, *Pegomyia lipsia.*

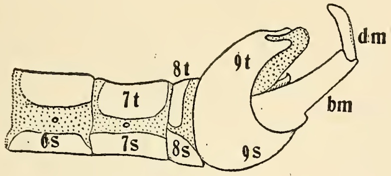
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Fig. 1

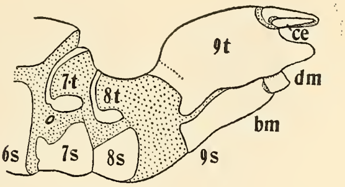
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Fig. 2

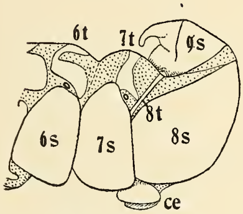
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Fig. 3

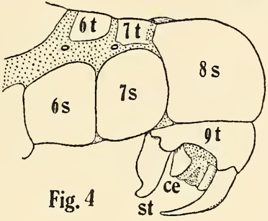
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Fig. 4

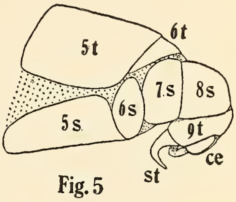
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Fig. 5

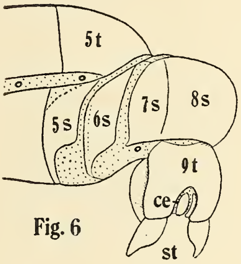
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Fig. 6

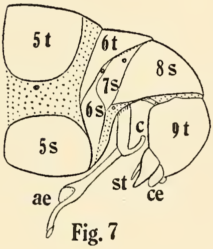
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Fig. 7

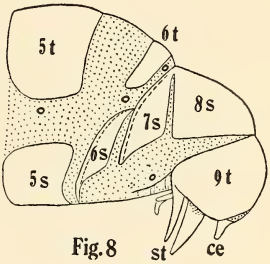
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Fig. 8

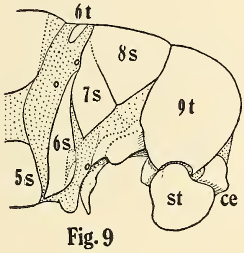
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Fig. 9

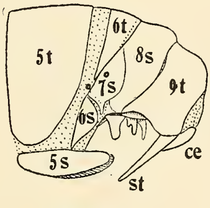
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Fig. 10

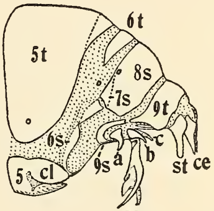
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Fig. 11

Fig. 20. A Sarcophagid, *Sarcophaga haemorrhoidalis.*
Fig. 21. A Scatophagid, *Scopeuma furcata.*
Fig. 22. A Glossinid, *Glossina* sp.
Fig. 23. An Anthomyiid, *Protohylemyia* (*Hylemyia*) *spiniventris.*
Fig. 24. An Anthomyiid, *Macrorchis ausoba.*
Fig. 25. An Anthomyid, *Macrorchis ausoba.*
Fig. 26. An Anthomyiid, *Phaonia nigricans.*
Fig. 27. A Muscid, *Ophyra leucostoma.*

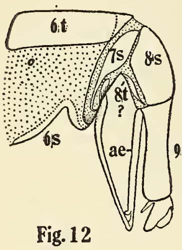
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Fig. 12

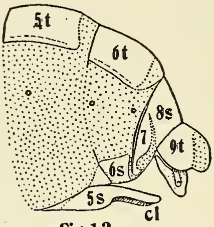
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Fig. 13

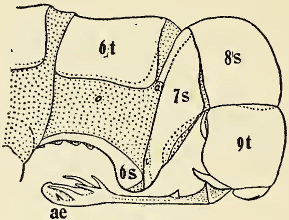
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Fig. 14

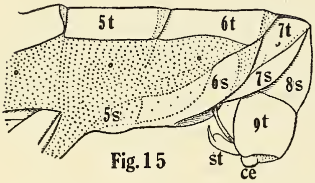
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Fig. 15

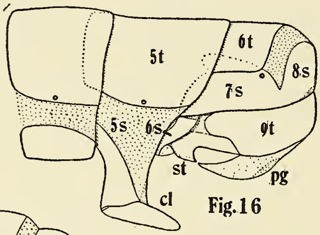
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Fig. 16

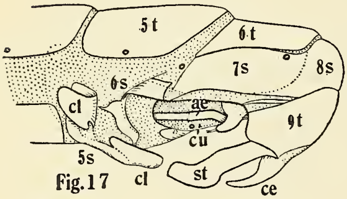
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Fig. 17

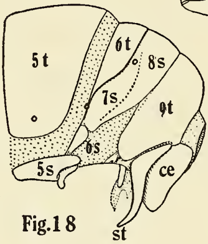
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Fig. 18

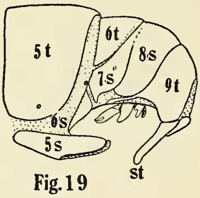
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Fig. 19

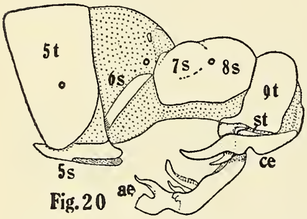
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Fig. 20

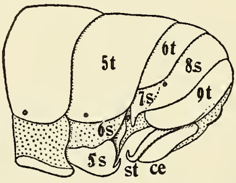
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Fig. 21

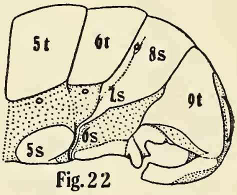
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Fig. 22

Fig. 28. An Anthomyiid, *Paregle cinerella.*
Fig. 29. An Anthomyiid, *Fannia canicularis.*
Fig. 30. A Muscid, *Musca domestica.*
Fig. 31. An Anthomyiid, *Limosia errans.*
Fig. 32. A Muscid, *Stomoxys calcitrans.*
Fig. 33. A Muscid, *Lyperosia irritans* (*Haematobia serrata*).
Fig. 34. An Anthomyiid, *Hylemyia antiqua.*
Fig. 35. A Tachinid (Larvaeovorid), *Cylindromyia binotata.*
Fig. 36. A Tachinid, *Gonia capitata.*

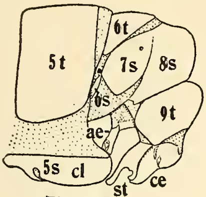
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Fig. 23

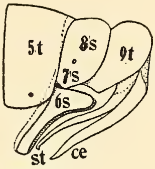
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Fig. 24

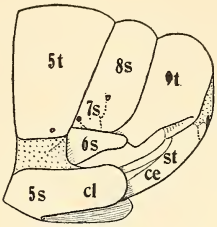
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Fig. 25

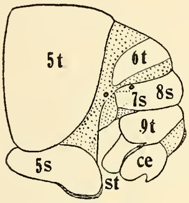
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Fig. 26

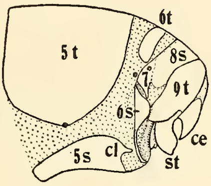
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Fig. 27

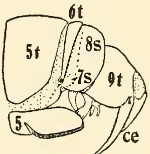
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Fig. 28 st

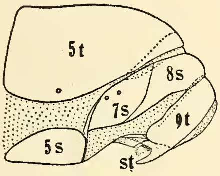
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Fig. 29

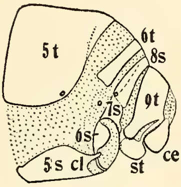
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Fig. 30

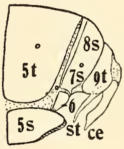
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Fig. 31

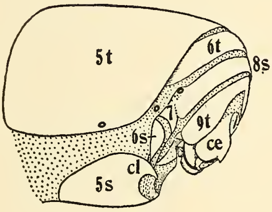
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Fig. 32

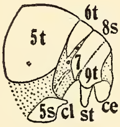
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Fig. 33

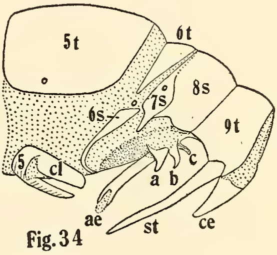
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Fig. 34

Fig. 37. A Tachinid, *Euphorocera claripennis.*
Fig. 38. A Tachinid, *Thelaira nigripes.*
Fig. 39. A Gasterophilid, *Gasterophilus intestinalis.*
Fig. 40. A Tachinid, *Phorichaeta sequax.*
Fig. 41. A Phasiid, *Microphthalma disjuncta.*
Fig. 42. A Cuterebrid, *Atrypoderma* (*Cuterebra*) *americana.*
Fig. 43. A Phasiid, *Trichopoda pennipes.*
Fig. 44. A Phasiid, *Cistogaster immaculata.*

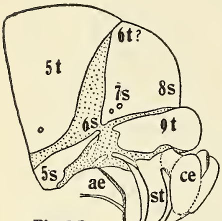
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Fig. 35

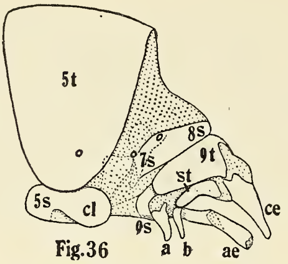
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Fig. 36

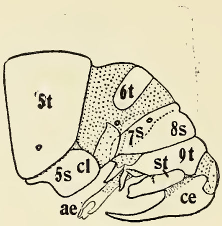
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Fig. 37

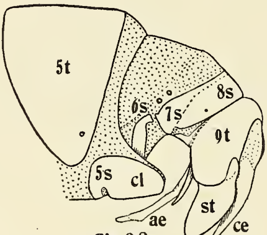
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Fig. 38

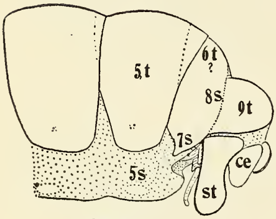
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Fig. 39

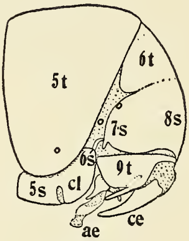
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Fig. 41

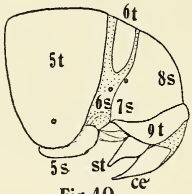
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Fig. 40

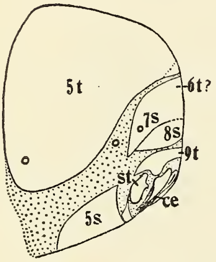
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Fig. 42

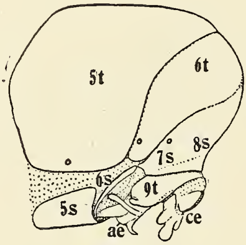
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Fig. 43

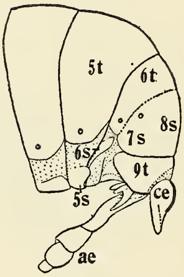
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Fig. 44

Fig. 45. A Sarcophagid, *Boettcheria latisterna.*
Fig. 46. A Calliphorid, *Cynomyia cadaverina.*
Fig. 47. A Sarcophagid, *Ravinia peniculata.*
Fig. 48. A Calliphorid, *Protophormia terraenovae.*
Fig. 49. A Calliphorid, *Phormia regina* (ventral view).
Fig. 50. A Calliphorid, *Calliphora erythrocephala.*
Fig. 51. A Calliphorid, *Lucilia illustris.*

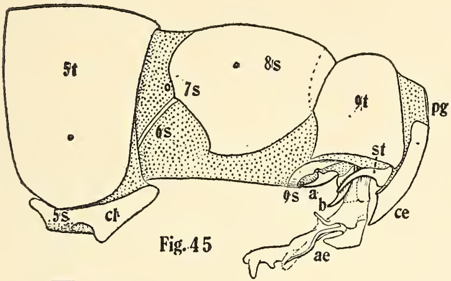
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Fig. 45

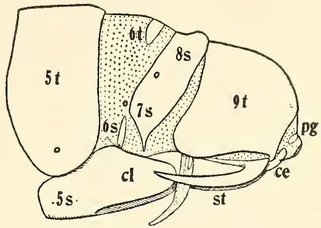
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Fig. 46

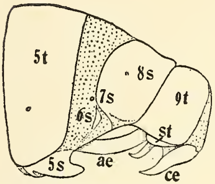
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Fig. 47

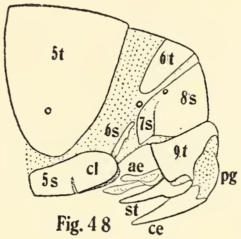
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Fig. 48

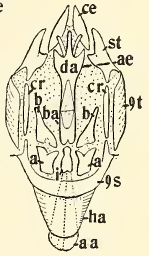
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Fig. 49

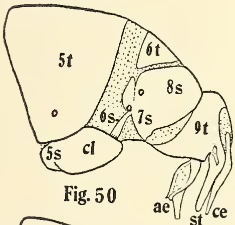
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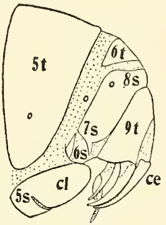
Fig. 50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ae

Fig. 51

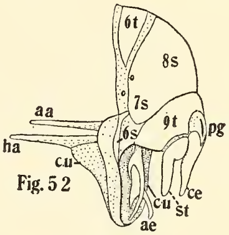
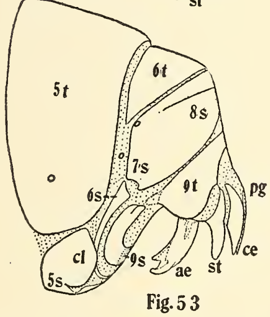

6t
8s
7s
aa
9t
pg
6s
ha
cu
ce
cu
st
ae

Fig. 52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8s
7s
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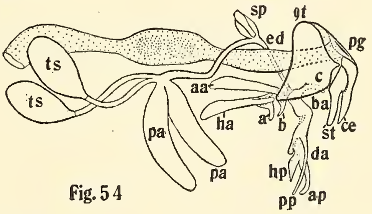
pg
6s
cl
9s
ce
5s
ae
st

Fig. 53


sp
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ba
ha
a
b
st
ce
pa
da
pa
hp
pp
ap

Fig. 54

Fig. 52. A Calliphorid, *Pollenia rudis.*
Fig. 53. A Calliphorid, *Cochliomyia americana.*
Fig. 54. A Calliphorid, *Phormia regina* (internal view of reproductive organs, showing looping up of ejaculatory duct over the top of the hindgut).

SYNONYMIC NOTES IN THE GENUS GLAENOCORISA THOMSON (HEMIPTERA, CORIXIDAE).

By H. B. Hungerford, University of Kansas.

Thomson in 1869[1] described *Corixa cavifrons* and proposed for this species the subgenus Glaenocorisa. His specimens came from Skane (Sweden) and Lapland. The species is a characteristic one and well known by the above name. Unfortunately Fieber in 1848[2] had misidentified this species as *Corisa carinata* Sahlberg and figured the male pala. On page 530 and just before his *Corisa carinata* he described *C. Dohrnii* for some females from Germany and Dalmatia that have since been recognized as probably the same as Thomson's *C. cavifrons.*[5] In 1851 Fieber[3] repeats the above and in 1860[4] places in his key (p. 99) the names in the following order: *C. carinata, C. Dohrnii, C. propinqua.* Jaczewski 1924[5] (p. 25) recognizes *C. propinqua* Fieber as being a *Glaenocorisa* and in 1928[6] considers *C. propinqua* Fieber as probably a synonym of *G. cavifrons* Thoms. This may have led Poisson 1935[7] to suggest that *C. propinqua* Fieb. should have priority over *C. cavifrons* Thomson if they are the same. However, if *C. Dohrnii* Fieber 1848 is the same as *G. cavifrons* Thomson 1869, then *C. Dohrnii* Fieber is the name that has priority over *G. cavifrons* Thomson and not *C. propinqua* Fieb. Thomson 1869[1] pointed out that his species was the same as *C. carinata* Fieber but not *C. carinata* C. Sahlb. 1819, an example of which he describes from Zetterstedt's Swedish collection. Lundblad 1922[8] discusses the confusion between *Glaenocorisa cavifrons* Thomson and *Arctocorisa carinata* (Sahlberg) and gives the distribution of the former in both text and map. He says that *A. carinata* (Sahlberg) is not now found in Sweden but gives the distribution of *Glaenocorisa cavifrons* Thomson as widespread and lists the published records. Among others is that of Strand[9] 1902 who reported the species from Aal (Norway). Fortunately I have a male specimen labeled "Aal—Strand" that came to me from Hawaii in a remnant of the Kirkaldy collection. To my surprise this specimen is not *Glaenocorisa cavifrons* Thomson, as we know it, but *Glaenocorisa quadrata* Walley[9] which was described from Quebec, Canada, in 1930. This is a most interesting extension of the distribution of *G. quadrata* Walley which I now know from the following places: Savonoski, Alaska, Naknek Lake; Aklavik, N. W. T.; Newfoundland, Trinity Goose Cove; and Aal, Norway. The presence of the species in Norway, however, throws some suspicion upon the published records of *G. cavifrons* Thomson. It may be that some other records of *G. cavifrons* Thomson apply to *G. quadrata* Walley and the problem needs a thorough review. In *G. quadrata* Walley the male pala has the peg row reaching up to the dorsal carina. In *G. cavifrons* Thomson this is not true.

Since Butler[11] and Hutchinson[12] had described the variation of *G. cavifrons* in Britain and pointed out that a large, dark form exists in the highlands of Scotland and Islay and a smaller, paler form in southern England, Hutchinson[13] 1928 states: "It is most unlikely that if the pale form of *cavifrons* exists outside Britain, it should have been entirely overlooked by Continental Hemipterists and we may reasonably suppose that *propinqua* refers to this pale southern race. The two extreme forms are so distinct in appearance that they would be readily mistaken for distinct species superficially and are certainly entitled to subspecific rank." He proposed to designate them *Glaenocorisa cavifrons cavifrons* Thoms., N. Europe, Scotland; and *Glaenocorisa cavifrons propinqua* Fieb., Austria, England.

According to Walton,[14] also, it is possible to recognize two varieties of *G. cavifrons.* One he calls *Glaenocorixa cavifrons propinqua* (Fieb.). Then he says, "The specimens of *Glaenocorixa propinqua* Fieb. are as large as *G. cavifrons* Th. but they differ in that they have dark brown mottlings and lines upon a golden background; the eyes are not quite so prominent and the facial impression is slightly deeper and higher between the eyes." In the specimen before me, labeled by Walton as *Glaenocorixa propinqua* Fieb., the facial impression is not deeper or higher than in the common *G. cavifrons* but the color pattern is quite different. China,[15] in his check list of British species of Hemiptera-Heteroptera, lists *Glaenocorisa propinqua* (Fieber 1860) and subspecies *cavifrons* Thomson 1869.

I am inclined to agree with Jaczewski[5] (p. 25) that *C. Dohrnii* Fieber is a *Glaenocorixa* but, since the species was known to Fieber only by female specimens which have not been re-examined in recent times, the matter can not be convincingly settled. The discovery of *Glaenocorisa quadrata* Walley from Norway makes advisable a re-examination of the distributional records of *Glaenocorisa cavifrons* Thomson.

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Unusual Fare of Praying Mantis.—At Baldwin, L. I., N. Y., on October 10, 1942, a female praying mantis, *Tenodera sinensis,* was discovered gripping a four-inch short-tailed shrew in its spiked forelegs. The animal was still warm when examined. It is possible that the shrew was originally caught by a cat and found injured by the mantis. When observed, the insect was beginning to feed on the animal, biting into the back of the neck just as is customary in devouring its normal fare of insects.—Edwin Way Teale, Baldwin, L. I., N. Y.

NEW SYRPHID FLIES FROM NORTH AND SOUTH AMERICA.

By F. M. Hull, University of Mississippi.

This paper describes several new forms of Syrphid flies that have been noticed in studies of material from North and South America.

Volucella lacticoerulea n. sp.

Face, front and antennae orange-brown. The face deeply concave above the tubercle and yellow pubescent. Mesonotum and abdomen shining bluish or greenish-black, with a coppery or purplish reflection in some lights; wings with a quadrate, brown spot. Legs black, black pilose. Related to *bassleri* Curran.

Male: Length 11 mm. *Head:* Face, front and cheeks and antennae light orange-brown, the vertex shining black with a few black hairs. The front and the very prominent facial tubercle black pilose on top with a few black hairs near the eye margins laterally upon the face and upon or lying near the quite short, anterior portion of the flattened crease. The antenna is elongate, with a very large basal pore, the third joint about three times as long as its middle width but considerably wider basally; arista yellow, dark brown apically, with thirty rays above. *Thorax:* Shining violaceous-black, in places bluish or greenish, with very thick, erect, delicate, black pile. The pleura are black and black pilose, the notapleura with four stout bristles; there are three bristles above the margin of the wing, five on the post calli and six to seven pairs of still longer ones upon the margin of the scutellum. There is a row of eight to ten stout bristles in front of the scutellum. Scutellum dark reddish-chestnut with sparse, slender, black pile on the disc. *Abdomen:* Wider than thorax, round or circular, moderately convex, and wholly shining bluish-black with in places a violaceous light and elsewhere brassy or greenish. The pile is almost entirely flat-appressed, thick-bristly and black, except that there is considerable short, white pile, appressed and directed outwardly on the basal portion of the second segment and this patch of white pile is more or less divided medially with rounded, medio-posterior margin. *Legs:* Black with black pile. *Wings:* Hyaline, with a large, dark brown quadrate spot in the middle anteriorly, the marginal cell closed, the stigmal cell yellowish basally and the coastal cell pale brown.

Female: Similar, without the lateral black hairs on the face; the front is also orange-brown, the narrow, elongate, subocular crease on the upper part of the front is dark brown and the pile of the front is sparse and black and erect.

Holotype male and allotype female, Praia Grande do Rio Feio Perapolis, São Paulo, Brazil.

Volucella hyalinipennis n. sp.

Face, front and antennae orange-brown; thorax, scutellum and abdomen blue-black with a reddish cast to the mesonotum and scutellum. Base of stigmal cell pale yellow; remainder of wing hyaline. Related to *chaetophora* Williston.

Male: Length 12 mm. *Head:* Vertex black, the front dark orange-brown, the face and cheeks light orange-brown with abundant short, black pile which is especially thick upon the rather prominent tubercle; the pile of the front is quite long and very thick, but absent upon the callus above the antennae. From in front the pile appears to form into two, wide, converging patches. The antennae are pale orange, the third joint rather long and quite narrow upon the apical half. The arista is brown, with thirty-six black rays above. The pile of the eyes is exceedingly dense, long and dark brown. *Thorax:* Mesonotum and scutellum shining greenish-black with a violaceous tinge throughout; its pile is long, delicate, very thick and black and similarly colored upon the black pleura. Squamae pale yellow with light brown border and concolorous fringe; there is a single, heavy, black bristle upon the upper part of the mesopleura, three smaller ones on the notapleura, three above the base of the wing, four very long heavy ones on the post calli, six or seven short ones in front of the scutellum and five pairs of heavy long bristles upon the scutellar margin; the pile on the disc of scutellum sparse and short. *Abdomen:* Everywhere shining purplish-black with dense, short, appressed, black pile and quite long black pile on the fourth segment, except that the second, third and fourth segments have each on their basal margin a more or less interrupted patch of appressed, silvery pile. *Legs:* Very dark brown, almost black, and with black pile. *Wings:* Hyaline, the costal cell wider than usual, the spines at the base of the costa unusually long and black; the base of the stigmal cell is pale yellow for a short distance, the marginal cell closed and petiolate.

Holotype: a male. Brazil.

Xylota primavera n. sp.

Related to *baton* Walker and *metallica* Wiedemann. Distinguished by the obtuse tubercle on male hind trochanters; base of hind femora quite narrowly yellowish; anterior four femora chiefly black.

Male: Length 9 mm. *Head:* Vertex shining black with black pile and pale yellow pile behind on the occiput. The front is shining black, bare except on the lower portion of the sides and with a few golden hairs along the sides and upper part of the front. The face is black with silvery pubescence. The antennae are brown upon the first two segments, light reddish upon the ventral basal two-thirds, the remainder black; the arista is light reddish on the basal half, apically black. *Thorax:* Mesonotum brassy, metallic black with thick, erect, yellowish pile, with whiter pile on the mesopleura and golden pile longer and tufted upon the upper posterior border of the mesopleura. There is a little patch of black spinules above the base of the wing but the post calli pile is entirely golden. Scutellum metallic, slightly greenish-black, with impressed rim and long, pale, golden pile and fringe. *Abdomen:* With parallel sides, first segment shining black, the second one faintly shining, brownish-black with on either side a large, almost quadrate, moderately separated, brownish-yellow spot; its antero-medial corners are more rounded and it approaches the base of the segment antero-laterally. The pile of the first segment is golden and long; it is erect and golden on the yellow portion of the second segment, black upon the black areas. Third segment with almost equally large, similarly colored, quadrate spots, their base resting on the base of the segment. All of these spots appear to reach the lateral margin, but as the lateral margin is very slightly curled over it is found to be brown laterally though quite narrowly. The spots of the third segment appear to be a trifle longer than wide, but due to the curl over are actually almost quadrate. Fifth segment metallic, shining, brownish-black with a few appressed black hairs in the middle basally and erect, rather long, golden hair on the posterior half of the sides. *Legs:* Hind femora quite narrowly, diffusely, yellowish-brown at its base, considerably thickened throughout the middle with pale yellow pile except dorsoapically and laterally, and with numerous, black, short, spinules ventrally, a few of which reach almost to the base. On the inner, apical, ventral portion of the femora there are four, quite long, sharp, black spines and four others opposite them on the outer side. The ventral margin of the femora is pinched into an arcuate ridge similar to *Planes* and it is along this ridge that most of the short spinules lie. Hind tibiae arcuate, blackish, and dark brown in the middle and pale yellow on the basal fourth, the pile is black on the dark areas, their tarsi dark brown; the last two joints are black dorsally. The metasternum is long, white pilose, and the coxae similarly pilose; the brown trochanters have a short but well-developed spur which is considerably longer than in *metallica* Wied. and with white pile. Middle and anterior femora brownish-black, the base and apex narrowly yellow, their pile whitish, their tibiae light brownish-yellow with a darker tinge in the middle, their tarsi yellowish on the first three joints, the others black. *Wings:* Nearly hyaline; stigmal cell dilute brownish-yellow; there is a small, brownish cloud on either side of the small crossvein.

Female: Similar to the male, the coxal spur absent, the hind femora perhaps slightly less thickened, the pile of the mesonotum more whitish, the ground color metallic whitish with four, very faint, coppery vittae; the front is wide with an obscure, whitish pubescent spot on each eye margin in the middle, the two more or less connected. The pile of the upper half of front and across the ocelli black but behind the ocelli yellowish. The third joint of the antennae is light orange-red and dark brown above. *Abdomen:* Broader, not parallel-sided, with a pair of rather small, subquadrate, orange-brown spots in the middle of each half of the segment and a little nearer the base and a similar pair of equally large spots similarly placed upon the third segment. Remainder of abdomen shining blackish, the fourth segment quite broad and with appressed white pile from base to apex and over whole posterior margin leaving the anteromedial portion flat and blackened and the anterior corners erect and white. Coloration of the legs very similar to that of the male.

Holotype: male. Oxford, Mississippi, March 29, 1943, on plum (F. M. Hull, collector). Allotype: female, taken at the same time.

I place here also two females, collected at the same time, which resemble *primavera* in many respects but in which the red spots are almost entirely obsolete upon the abdomen and are completely absent and melanic upon the third segment. The antennae more nearly resemble the male than does the allotype. However, these females all have, as does the male, a slight brownish cloud on either side of the small crossvein. Also the dark brown area in the middle of the front fore tibiae is more extensive and darker.

Brachypalpus trifasciata n. sp.

Characterized by the three pairs of bluish, brassy, subrectangular spots upon the abdomen, the brassy, black-vittate mesonotum and the brownish femora. Related to *pigra* Lovett.

Female: Length 11.5 mm. *Head:* Occiput and vertex shining, metallic black, with a slightly brassy appearance opposite the ocelli and thinly dusted with whitish-grey pollen; the front is wide, flat, brassy across the middle but is widely greyish or yellowish-white pubescent upon the upper portion and again in front of the antennae; the transverse, brassy area across the middle of the front is narrowly divided by an upward extension from the pubescent area in front of the antennae. The face and cheeks are brown, the former shining on the posterior portion, but widely and broadly yellowish-white pubescent over the entire middle of the face. This pubescent area extends diagonally up to the eye margin and the face opposite the antennae is left bare. The first two joints of the antennae are brownish-yellow, the third joint is light brown, becoming greyish above. The thickened arista is pale yellow, darker near the tip. The pile of the face, front and vertex is pale yellowish-white. *Thorax:* Brassy black, the ground color almost wholly obscured by pale, yellowish-white pubescence which allows the brassy lustre to show through. There is a pair of black, submedial vittae not far apart, and sublaterally upon either side there is a second pair of vittae which are interrupted at the suture and the anterior section in front of the suture is very much widened. The humeri are concolorous with the sides of the mesonotum. The pleura are dark brown, shining, slightly metallic and thinly whitish pollinose. The scutellum is bright brassy; all of the pile of the thorax is whitish and rather long and especially long upon the scutellum. *Abdomen:* First segment brown, pale grey pollinose, the remainder of abdomen black with a slight bluish reflection and upon the second, third, and fourth segments there are large, basal rectangles that are grey pollinose. The rectangles upon the second segment are separated by a medial extension of black from the wide posterior fascia, and this extension is not quite as wide as the posterior fascia. Upon the third and fourth segments the spots are more narrowly separated and their postero-medial corners less rectangular. The pile of the abdomen beyond the middle of the second segment is chiefly appressed and is blackish upon the black areas. The pile is pale yellowish along the lateral margins upon the rectangles and over much of the black posterior fascia upon the fourth segment. There is a fringe of very long, yellowish pile upon the apex of the fourth segment. The fifth segment is pale brown and pale yellow pilose. *Legs:* Pale brown, all of the pile pale yellow; the hind femora has six or seven, short, black setae ventrally and distally upon both sides. The bases and apices of all of the tibiae and first three tarsal joints of all the tarsi are yellowish. *Wings:* Almost hyaline but slightly brownish; there is a trace of brown clouds margining the small crossvein and the middle crossvein and the base of second and third veins.

Holotype: one female. Near Mount Rainier, Washington, July, 1926 (F. M. Hull).

FOUR NEW AMERICAN TINGITIDAE (HEMIPTERA).

By Carl J. Drake and José C. M. Carvalho, Ames, Iowa.

This paper contains the descriptions of three new Tingitidae from the United States and one from British Guiana, S. A. The types are in the Drake Collection.

Teleonemia guyanensis sp. nov.

Moderately elongated, brown, with prominent, testaceous areas; head dark brown, with five moderately long, testaceous spines; antennae very long, dark brown, rather slender, very shortly, densely pilose; segment I short, slightly thicker and a little longer than III, III very long, slightly bent, faintly enlarged distally, 3 times as long as IV, the latter much longer than I and II conjoined; rostral channel deep, the laminae testaceous and parallel on meso- and metasternum, not meeting behind; rostrum long, yellowish brown, darker apically, reaching almost to the end of channel; body beneath yellowish brown, darker between abdominal segments; legs brown, the tibiae mostly testaceous, the tarsi dark.

Pronotum moderately convex above, coarsely pitted, sharply tricarinate, each carina with a row of small areolae; lateral carinae slightly, broadly constricted behind disc; paranota very narrow, without areolae behind, in front a little wider and uniseriate; hood sharply raised, roof-like, triangularly projecting in front, the median carina extending to apex of hood; the anterior portion of pronotum including hood, testaceous; triangular process long, areolate, brown. Elytra brown, the basal and apical thirds of costal area, the basal third and apical fifth of subcostal and small basal portion of discoidal areas, testaceous; costal area narrow, distinctly wider in widest part, there biseriate, the areolae along the basal portion to the hind margin of transverse band small; subcostal area biseriate; the areolae moderately large; discoidal area large, extending beyond middle of elytra, the outer margin arcuate, widest before middle, there five areolae deep, narrowed at both base and apex; sutural area widely reticulated, the areolae clouded with dark fuscous.

Length, 1.53 mm., width, 4.90 mm.

Type, female, Mallali, British Guiana, H. S. Parish.

Separated from *T. schildi* Drake, *T. rugosa* Champion, *T. argentinensis* Drake and Hambleton and related forms by the color markings, and the costal area in widest part opposite apex of discoidal area is biseriate. *T. dulcis* Drake is much longer, with distinctly longer legs and antennae, and yellowish brown color.

Gargaphia balli sp. nov.

Small, testaceous to brownish, with large, black-fuscous markings. Head black, with five, slender, rather short, testaceous or brownish spines. Eyes black. Antennae long, brownish, indistinctly pilose, segment I moderately long, stouter and about three and one-half times as long as II; III slightly more than three times as long as IV; IV mostly black, moderately swollen. Rostral channel interrupted, the laminae areolate, rostrum extending almost to the transverse laminae.

Pronotum moderately convex, black, coarsely pitted, tricarinate; carinae strongly foliaceous, uniseriate, the areolae large; paranota moderately broad, strongly reflexed, projecting almost vertically, widest opposite humeri, there distinctly angulate; hood small, inflated, projecting slightly in front; marginal veins of paranota and carinae clothed with long, pale hairs, also some of the veins of hood. Elytra broadest in front of middle, becoming narrower posteriorly; costal area uniseriate, the areolae moderately large, hyaline, the transverse nervelets black-fuscous; discoidal area mostly biseriate, sometimes partly triseriate, the nervelets dark fuscous; discoidal area moderately impressed, widest a little before apex, testaceous, with large dark fuscous spot before apex, four or five areolae deep in widest part; sutural area with nervures brown to dark fuscous, the areolae becoming abruptly larger distally. Legs dark brown, shortly setose.

Length, 2.70 mm.; width, 1.00 mm.

Type, male, Naco, Ariz., Sept. 12, 1935, E. D. Ball; allotype, female, Huachuca, Ariz., Sept. 13, 1935, E. D. Ball; 2 paratypes, one with type and other with allotype; 2 paratypes, Carlsbad, N. Mex., Aug. 19, 1917, H. M. Harris; 1 specimen, Loving, N. Mex., Aug. 20, 1917, H. M. Harris.

This species is named in honor of Dr. E. D. Ball, who has done so much to increase our knowledge of the insects of Arizona. It is probably most closely related to *G. condensa* Gibson, but much smaller and has the costal area entirely uniseriate.

Gargaphia tuthilli sp. nov.

Moderately elongate, slender, the nervures with rather long, fine, pale hairs. Head and pronotum black, the membranous areas testaceous, some of the nervelets partly embrowned or fuscous. Antennae long, finely pilose, testaceous, the first, second and third segments black; segment I stouter, about three times as long as II, the latter dark brown to black; III three times as long as IV, the latter slightly thickened. Head black, convex above, with five moderately long, testaceous spines. Rostrum yellowish brown, darker apically, nearly reaching transverse laminae. Legs testaceous, the tarsi dark. Body beneath black.

Pronotum moderately convex, tricarinate; carinae foliaceous, uniseriate, the areolae moderately large, the lateral carina slightly constricted behind disc, the median carina slightly arched; paranota not very wide, strongly reflexed, biseriate, a little wider but scarcely angulate opposite humeral angles; triangular process testaceous, areolate. Hood rather small, slightly compressed laterally. Elytra rather slender, slightly constricted behind middle; jointly rounded behind in repose; costal area moderately broad, biseriate (in one specimen with an extra areola in widest part), the areolae moderately large, hyaline; subcostal area narrower, mostly triseriate, the areolae considerably smaller; discoidal area rather long, narrow, nearly reaching middle of elytra, widest a little beyond middle, there three or four areolae deep; sutural area with apical areolae and those along the inner margin larger. Wings extending beyond tip of abdomen.

Length, 3.32 mm.; width, 1.30 mm.

Type, male, and paratype, Mesa Verde, Colo., July 3, 1937, L. D. Tuthill; paratype, male, Durango, Colo., July 2, 1937, L. D. Tuthill.

Gargaphia arizonica sp. nov.

Head black, with five, long, slender, porrect, testaceous spines. Antennae slender, segments I and II black, the former distinctly thicker and twice the length of the latter; III testaceous, indistinctly pilose; IV mostly brownish black, slightly thickened, with longer pale hairs, longer than I and II conjoined. Rostral laminae whitish, the rostrum extending to the interrupted channel. Body beneath black. Legs slender, pale testaceous, the tips of tarsi dark.

Pronotum moderately convex, black, the carinae, hood, triangular process and paranota testaceous; carinae considerably raised, uniseriate, the areolae large; lateral carinae faintly divaricating behind and slightly concave within in front, the median not arched; paranota rather narrow, biseriate, not sharply produced and subrounded opposite humeri, a little narrowed anteriorly, strongly reflexed; hood moderately large, slightly produced in front, inflated, longer than high, the nervures of carinae, hood and paranota clothed with long, fine, pale hairs. Elytra testaceous, with few nervelets embrowned, completely overlapping behind in repose; costal area moderately wide, biseriate, the areolae moderately large and hyaline; subcostal area biseriate; discoidal area extending to middle of elytra, widest behind middle, there four or five areolae deep, the nervelets behind embrowned; sutural area widely areolated, the areolae clear; nervure separating costal and subcostal areas clothed with fine, long, pale hairs, these not as numerous as on carinae. Wings longer than abdomen.

Length, 3.55 mm.; width, 1.20 mm.

Type, male, Huachuca Mts., Aug., 1934, C. J. Drake; allotype, female, taken with type; paratypes, taken with type; Santa Rita Mts., E. D. Ball; Mexico City, Mexico; Bluewater Mts., New Mexico; Brownsville, Tex., June 21, 1908; Loving, N. Mex., Aug. 20, 1937, H. M. Harris.

This species may be separated from *G. iridescens* Champ. and *G. condensa* Gibson by the narrower paranota, lower hood and the median carinae not sharply arched behind hood. In *G. iridescens* the costal are is triseriate in widest part. The paranota are sharply produced and distinctly angulate opposite humeri in *G. condensa* Gibson.

Crambus teterrellus.—In connection with Klots's note on the recent northward movement of this species, the following records will fill out the picture, and bring it into a decidedly cooler life zone. Ithaca, abundant since 1937, also taken in 1932; Minetto (near Oswego), found abundant in June and Aug., 1938; Buffalo, 1933 (Krombein); Orient and Southold (L. I.) since 1932, and Mattituck and Riverhead at least since 1933 (Latham). On the other hand it was not among over 6000 Crambus of 16 species taken at a light on the Cornell Campus in 1919, 1922 and 1924. At Woods Hole, Mass., well north of New York but in a very mild coastal strip I took it in 1917 and 1925. Long Id. dates range at least from May to November, Ithaca ones were collected in June.—Wm. T. M. Forbes, Ithaca, N. Y.

Insects

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BULLETIN

OF THE

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Vol. XXXIX April, 1944 No. 2

TWO NEW ADEPHAGID WATER BEETLES FROM THE PACIFIC NORTHWEST.

By Melville H. Hatch, University of Washington,
Seattle, Wash.

Haliplus (s. str.) **wallisi** sp. nov. (Haliplidae.)

Length: male, 1.8–2.0 mm.; female, 2.0–2.25 mm. Color testaceous, head with vertex definitely darker, the pronotum and elytra feebly and indefinitely obfuscate, the abdomen black (male) or somewhat obfuscate (female). Head finely sparsely punctate, the distance between the eyes about three-fifths that of the total width of the head. Pronotum four-sevenths to three-fifths as long as wide, the apex about two-thirds as wide as the base, the sides convergent, usually nearly straight, briefly arcuate before the acute prominent front angles; rarely the sides may be feebly arcuate or feebly subsinuate basally; hind angles nearly rectangular; base of pronotum with a pair of deeply impressed longitudinal slightly convergent plicae which extend forward more than one-third the length of the pronotum; with a deeply impressed coarsely punctate transverse furrow between the plicae just in front of the base of the pronotum, the area in front of the transverse furrow somewhat smoother than the rest of the disc of the pronotum which is coarsely punctate. Pronotum about as wide as the elytra at the base, the sides of the pronotum and elytra discontinuous, forming an obtuse angle. Elytra shining, the disc with nine unimpressed series of punctures which are separated from each other by about their own diameter, the intervals very sparsely set with minute punctures; elytral apices narrowly rounded. Prosternal lobe margined at sides and apex, the disc somewhat concave or more or less broadly channelled. Apical two-thirds (male) or apical half (female) of last ventral abdominal segment roughly coarsely punctate.

Type male, allotype female, and 62 paratypes: Upper Grand Coulee, Steamboat Rock, Wash., Apr. 30, 1939, M. H. Hatch. One paratype: Upper Grand Coulee, Wash., Apr. 21, 1938, M. H. Hatch. Four paratypes: Blue Lake (Lincoln Co.), Wash., May 1, 1938. All in collection of author. The main series occurred in great abundance in a shallow pond of clear water in an interesting situation that is likely to be destroyed by the development of the Grand Coulee irrigation project. It is named after Mr. J. B. Wallis, in recognition of his fine paper on the North American species of this genus.

This pecies is distinguished from the other species of the subgenus *Haliplus* s. str. by the transverse furrow between the basal plicae on the pronotum.[1] It would seem to run to couplets 5 or 6 of Wallis' key (Trans. Royal Canadian Inst. XIX (1), 1933, p. 6), but among the four species included therein it appears to be distinguished further by its small size, its immaculate elytra, and the discontinuous outline of its pronotum and elytra.

Hydroporus (Oreodytes) productotruncatus sp. nov. (Dytiscidae.)

Elongate oval, virtually glabrous, the elytra each with two obscure impressed series of punctures bearing obscure hairs. Above evidently moderately punctate, microreticulate, the punctures somewhat finer on the head and pronotum, the microreticulation with a tendency to exhibit micropunctures. Appendages and dorsal surface testaceous, the latter somewhat variably marked as follows: the head with a basal band fused with an oblique band along the inner margin of each eye; the disc of the pronotum with two transverse bands, sometimes interrupted at the middle; the elytra each with a common sutural and six entire narrow vittae and one or two interrupted lateral ones. Pronotum narrower at base than elytra, with a rugose impression on either side along the base, widest at the more or less acute hind angles; the side margins more or less sinuate before the hind angles, thence arcuate to the front angles. Elytra with the apex more or less produced; the male with the lateral angle of the lobe broadly and the sutural angle narrowly rounded; the female with both outer and inner angles of the lobe rectangular or subacute, the apex truncate or slightly sinuate, the lateral margins parallel or slightly incurved. Venter black, the epipleura sometimes narrowly and variably pale along the outer margin at the base. Epipleura not impressed at base for reception of mesofemur. Last abdominal sternite oblique, more strongly so in the female with the posterior margin deflexed in a distinct process the apex of which is again further deflexed, so that it appears sinuate in caudal view, arcuate in ventral view. Length 5 to 5.5 mm.

---

[1] The European *H.* (*Neophaliplus*) *lineatocollis* Marsh. has a faint transverse impression at the base of the pronotum.

Type and 7 paratype females, allotype and 6 paratype males: "Fairmont," B. C., June 29, 1937, in collection of author—probably taken at Fairmont Springs (Fairmont Hot Springs) in the western foothills of the Rocky Mountains in southeastern British Columbia.

This species runs to *alaskanus* Fall and *rainieri* Hatch in Hatch's key to the species of the subgenus *Oreodytes* (Hatch, Bull. Brooklyn Ent. Soc., XXVIII, 1933, p. 23–25), being identified therewith by the apical process of the last abdominal sternite in the female. From both of these it is distinguished by the more conspicuously produced elytral apex, that of the female in particular being strongly produced with rectangular or subacute outer angles. In most other respects *productotruncatus* appears to resemble *rainieri* rather than *alaskanus*. These three species are allopatric in their distribution, respectively in southeastern British Columbia, western Washington, and southeastern Alaska.

Allonyx Leconte, a Homonym.—*Allonyx* Leconte, 1862 (not 1860), Smiths. Misc. Coll., III, 193. Melyridae. Genotype *A.* (*Dasystes*) *sculptilis* Leconte, is a homonym of, and preoccupied by *Allonyx* Duval, 1860 (not 1861), Gen. Col. Eur., III, 196. Cleridae. Genotype *A. quadrimaculatus* Schall. These two genera, both of which have appeared in our latest catalogues, with wrongly attributed dates, it becomes necessary to reverse the synonymy as there given. The *Allonyx* of Duval having undoubted priority, it becomes essential to rename the genus *Allonyx* of Leconte. The writer here proposes the term **Enallonyx** (ἐνἄλλοςὄνυξ), with genotype *E. sculptilis* Leconte, as before.—A. B. Wolcott, Downers Grove, Ill.

VERNAL FLIGHT OF MALES IN SOME WESTERN BUMBLEBEES (HYMENOPTERA, BOMBIDAE).

By E. Gorton Linsley, University of California,
Berkeley, Calif.

Frison,[1] in the course of his studies of the biologies of the bumblebees of Illinois, has pointed out that the males of *Bombus bimaculatus* Cresson appear early, usually in July but sometimes as early as the middle of June. Apparently the same is true for certain western bumblebees. Linsley and Michener[2] have reported the capture on June 12, 1941, of males of *Bombus edwardsii* Cresson at Manzanita Lake, Shasta County, California, and on May 19, 1941, at Viola, Shasta County. Since the first locality is at an elevation of nearly 6000 ft., the latter at about 5000 ft., both dates fall in the Spring season. In 1942, I had an opportunity to verify spring flights of several species of male bumblebees in the Sierra Nevada Mountains of Madera and Mariposa Counties, California. Males of *B. edwardsii* were abundant at Oakhurst when this locality was first visited on June 4, where they were about flowers of lupine. At Miami Ranger Station and Fish Camp, elevation approximately 5000 ft., queens of *Bombus edwardsii* and *B. vosnesenskii* were abundant when we arrived on May 10, but gradually tapered off and were scarce after June 1. Workers of these two species were not yet common on June 1. However, after June 1, males began to appear in numbers. On June 10, a random sample of bumblebees taken from flowers in the meadows near Fish Camp (*Eriogonum* predominant) yielded the following specimens:[3]

Species	Males	Queens	Workers
Bombus edwardsii Cresson	217	1	0
Bombus vosnesenskii (Rads.) ..	5	1	0
Bombus sitkensis Nylander	2	0	0

---

[1] Frison, T. H. A contribution to the knowledge of the life history of *Bremus bimaculatus* (Cresson). Entom. Amer., 8: 159–214. 1928.

[2] Linsley, E. G., and C. D. Michener. Notes on some Hymenoptera from the vicinity of Mt. Lassen, California. Pan-Pac. Ent., 18: 27–29. 1942.

[3] Identifications by Mr. P. H. Timberlake, Citrus Experiment Station, Riverside, California.

Psithyrus crawfordi Franklin	49	0	–
Psithyrus fernaldae Franklin	2	0	–
Total	275	2	0

Two days later, on June 12, male bumblebees were observed in great abundance at Wawona, Mariposa County; a few queens were present but no workers were observed. One additional observation may also be mentioned. On May 6, 1943, a male of *Bombus edwardsii* was captured on the campus of the University of California at Berkeley.

Frison (*in litt.*) suggests that the early production of males may be characteristic of several species of the subgenus *Pratobombus* and that the sexes mate early and the queens then aestivate.

THE SHIFT FROM AQUATIC TO AERIAL RESPIRATION IN DRAGONFLIES.

By James G. Needham, Ithaca, N. Y.

Three nymphs of the very pretty little dragonfly that Linnaeus called *Libellula ornata* (now placed in *Celithemis*) were collected from a shallow flat-woods pond near Englewood, Florida, on the first day of March. Two of these nymphs showed by the crumpling of their developing wings, as seen through the transparent sheaths, that they were nearing their time of transformation. So I placed them in a wire-cloth pillow cage where I could watch the remaining phases of their nymphal behavior.

Both these nymphs made shifts of position that had to do with the change from aquatic to aerial respiration. Each in its turn (they were two days apart) climbed up the cloth into the air just far enough to expose its high-placed mesothoracic spiracles at the surface film of the water, as if to start them to breathing free air. Then it stayed there head up and motionless for one day.

Then each moved forward again up the screen enough farther so that the anal aperture of the rectal gill chamber was just dipping into the surface film, and stayed there immovable for two days. Then each transformed the following night, and was ready to begin aerial activity the next morning; its shining wings, tinted with gold and streaked with brown at the base, fully expanded; its cast-off gills left behind in the nymphal skin.

One day had been given to introducing the aerial, two days to tapering off the aquatic mode of respiration.

THE TRAGEDY OF THE MOTH AND THE FLAME.

By Phil Rau, Kirkwood, Mo.

Fortunate it is for entomology that the story of the "Tragedy of the Moth and the Flame" has not penetrated its literature, although it came mighty near doing so in the days not long gone, when Loeb with his tropism theory was in his heyday. That it has penetrated the realms of poetry and morals is readily seen by the few chance lines by Byron, Shelley, Carlyle, Gay, Shakespere, Tennyson, and others, where it is used to point to a moral for the young:

"Maidens like moths are caught by glare,"

. . . .

"The desire of the moth for the star,"

. . . .

"Poor moth! Thy fate my own resembles,"

. . . .

"Moth-like every man a lover,"

. . . .

"How they flutter, never thinking what a
doom awaits their wings,"

. . . .

"That not a moth with vain desire,"

. . . .

"Thus hath the candle singed the moth,"

. . . .

"How like the moth, the simple maid still
plays about the flame,"

. . . .

"What gained thee, little moth? Thy ashes,
thy one brief parting pang may show,"

One hardly knows where to turn to learn the origin of this story, but one dare not go back too far in search of it, for at one time man had no flame for the moths to go to.

It appears, however, that not one of the writers who so glibly used the story of the moth and the flame had ever spent an evening observing the frail insects before the flickering light. When they speak of the lure of the moth to the flame, of singed wings or of cruel death, they speak not from first-hand observation, but from hearsay.

With open eyes and a little patience, they readily could have seen that only a small part of the moth population of an area is attracted to the flame, and of this only a small portion meets death or gets scorched wings. Most of those which come to the flame to dance and to flutter, finally settle quietly on wall or ceiling—often in the role of husband or wife.

Observers would see, no doubt, that the flame is sometimes of biological importance to the moth and not one wholly of destruction. They would see too, as I have sometimes seen, and as laboratory experiments have proved (this may burst the bubble of analogy for the moralist) that moths with damaged wings are occasionally acceptable as mates.

Of course, the story of the moth and the flame could have arisen only with the use of candles by mankind. A moth would have had a hard time during the early history of man to get its wings singed, for then the only flames were in shallow grottoes where the cave-men dwelt; and these were few and far between. And there was a still earlier period when the moths could not possibly have gotten their wings scorched, for man and his fire-light had not yet appeared on earth—the moth having preceded man by a long stretch of time.

Today the old order is outmoded, and moths may fly to the flame without flying to their destruction. They may dance and frolic in the alluring atmosphere of light and heat and not suffer death or even the singeing of their wings for their recklessness. The work of Thomas A. Edison is responsible, and poets can no longer rely on their time-worn analogy of the moth and the flame.

AN EXPERIMENT ON THE EFFECT OF SODIUM CHLORIDE UPON THE LARVAE OF CULEX PIPIENS LIN.

By John W. Noaks, Brooklyn, N. Y.

The following experiment was undertaken in order to find the point at which the larvae of *Culex pipiens* Lin. begin to die when using different dilutions of sodium chloride. It is possible that a similar experiment may be of some use in the control of the salt-marsh mosquito. Since *Culex pipiens* breeds in fresh water it will be interesting to compare its salt death point with the salt death point of the salt-marsh mosquito.

I am indebted to Dr. C. H. Curran and Mr. A. T. Gaul for their encouragement and technical assistance.

Technique.

A brood of *Culex pipiens* was secured on July 11, 1943, at Flushing Park, Queens, N. Y. The mosquitoes matured and a number of second generation egg masses were laid, of which a certain number were used for this experiment. These eggs hatched at 10:00 A.M. on July 27. The temperature, ranging from 25° C. to 29° C., was recorded every hour on the hour throughout the experiment.

A yeast dilution was added to the salt solutions to feed the larvae. One cake of yeast was added to 200 cc. of water of which one drop was added to every 25 cc. of the solution in which the larvae were placed.

At 10:00 A.M. on July 28 ten larvae were put into each of the following dilutions of sodium chloride:

0.001 N in increasing concentrations of 0.001 to 0.009 N
0.01 N " " " " 0.01 " 0.09 N
0.1 N " " " " 0.1 " 1.0 N

For a period of 12 hours a recording was made every 15 minutes. During the remainder of the larval stage the recordings were made every 12 hours.

After obtaining a general graph on the above experiment a series of dilutions was made, ranging from the point at which the larvae began to show signs of being affected by the salt to the point at which the larvae definitely died. The dilutions of sodium chloride used were as follows:

0.2 N, 0.225 N, 0.250 N, 0.275 N, 0.3 N

By using these dilutions it was possible to secure a recording that showed the point fairly accurately at which the larvae died. The recordings were made every 15 minutes for the duration of the experiment.

Each one of the dilutions had the following specifications:

The volume of all dilutions were the same.
Each beaker contained 50 cc. of the dilutions used.

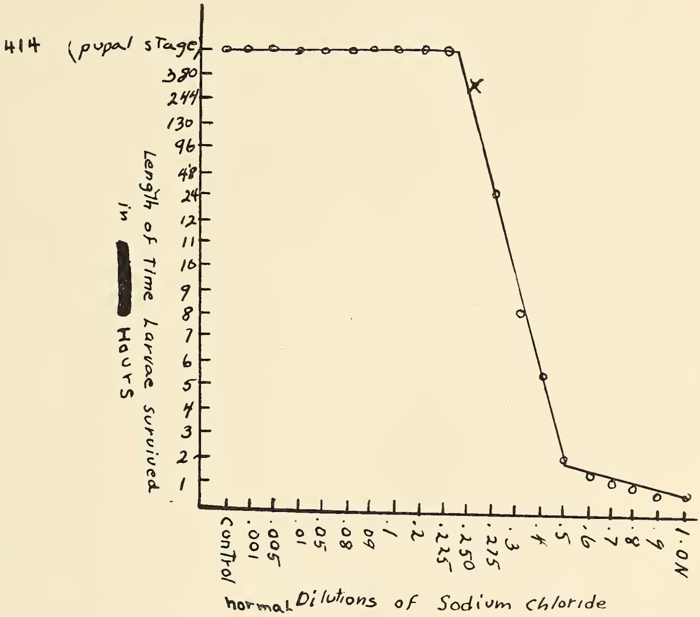

Figure 1. The above graph shows the effect of dilutions of sodium chloride upon the larvae of *Culex pipiens* Lin.

RESULTS.

At the 414th hour the larvae in the control solution and those in dilutions 0.001 N to 0.225 N reached the pupal stage. The larvae died in 0.250 N after surviving 349 hours in the dilution, this being the point at which the larvae start to die, an (X) was recorded on the graph.

The larvae in 0.275 N died 325 hours before those in 0.250 N showing that the larvae die readily after reaching 0.250 N. The larvae continue to die at wide intervals in dilutions below 0.5 N. It is interesting to note that the larvae in the dilutions above 0.5 N die within 15 minutes of each other. This illustrates that the dilutions below 0.5 N have a less lethal effect upon the larvae.

After checking the experiment, the conclusion reached was that 0.250 N is the point at which the larvae of *Culex pipiens* begin to die when using dilutions of sodium chloride.

HOST RELATIONSHIPS OF SOME SAPYGID WASPS. (HYMENOPTERA, SAPYGIDAE).

By E. Gorton Linsley, University of California,
Berkeley, Calif.

Most sapygid wasps appear to be parasitic in the nests of megachilid bees, although *Polochrum repandum* Spin. and *P. fallax* (Gerst.) are parasites of *Xylocopa violacea* (Linn.) and *X. augusti* Lep., respectively (Friese, 1923). In Europe, Friese (1923, 1926) has recorded *Sapyga quinquepunctata* (Fab.) as parasitic on *Osmia aurulenta* (Panzer) and *O. fulviventris* (Panzer) (= *O. ventralis* Panz.), *Sapyga similis* (Fab.) on *O. nigriventris* (Zetterstedt) (= *corticalis* Müller), *O. maritima* Friese, and *O. fuciformis* Latr., and *Sapyga clavicornis* (Linn.) on *Chelostoma florisomnis* (Linn.). In North America, hosts of sapygids have been recorded as follows:

Species	Host	Area	Authority
Eusapyga aciculata Cress.	*Hoplitis* sp.	Calif.	Hicks, 1934
Eusapyga proxima Cress.	*Dianthidium pudicum* (Cress.)*	Colo.	Hicks, 1927
Eusapyga rubripes Cress.	*Dianthidium pudicum* (Cress.)*	Colo.	Hicks, 1934
Eusapyga verticalis Cress.	*Dianthidium consimile* (Ashm.)	Calif.	Hicks, 1934
Sapyga aculeata Cress.	*Hoplitis productus* (Cress.)	Calif.	Davidson, 1896
Sapyga emarginata Cress.	*Osmia hesperella* Ckll.	Colo.	Hicks, 1934
	O. lignaria propinqua Cress.	Colo.	Hicks, 1934
Sapyga minor Roberts	*Dianthidium consimile* (Ashm.)	Calif.	Hicks, 1934
	Osmia sp.	Colo.	Hicks, 1934
Sapyga sp.	*Dianthidium pudicum* (Cress.)*	Colo.	Hicks, 1934

* Probably *D. pudicum* subsp. *decorum* Timberlake.

To these records the following may be added from California:

Sapyga fulvicornis Cresson. Reared by J. W. MacSwain and the writer, from nests of *Megachilé angelarum* Ckll. and *Osmia pikei* Ckll. collected in Mineral King, Tulare County, by G. E. Bohart. Also from nests of *Osmia atrocyanea* Ckll. from Miami Ranger Station, Mariposa Co. Emergence dates in the laboratory ranged from February to June.

Sapyga aculeata Cresson. Reared from nests of *Hoplitis* sp. nr. *productus* (Cresson) in elderberry twigs collected by G. E. Bohart at Mineral King, and by the writer at Miami Ranger Station, Mariposa County. The host bee differs from both *H. productus* (Cresson) and *H. sambuci* (Titus) and according to C. D. Michener is apparently undescribed.

Sapyga sp. An undetermined and possibly new species of *Sapyga* (R. M. Bohart, *in litt.*) was reared from nests of *Ashmeadiella* sp.

collected by J. W. MacSwain and the writer at Mt. Diablo, Contra Costa Co. Although neither the host nor the parasite can be specifically identified at this time, the record is submitted as the first from the genus *Ashmeadiella.*

It may thus be seen that the species of *Sapyga* parasitize megachilid bees of the genera *Osmia, Hoplitis, Chelostoma, Ashmeadiella, Megachile* and *Dianthidium,* and *Eusapyga, Dianthidium,* and *Hoplitis.* Probably both generic lists will be increased when the biologies of our species are more fully known.

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ADDITIONAL SPECIES OF THE GENUS BACCHA FROM THE NEW WORLD.

By F. M. Hull, University of Mississippi,
University, Miss.

This paper describes several additional species of *Baccha*. The material is part of a large assemblage of Syrphid flies, mostly from Brazil and Ecuador, belonging to Dr. C. L. Fluke, and I am indebted to him for the privilege of study. The types are in his collection.

Baccha princeps n. sp.

Related to *prunella* Hull, the scutellum is distinctly yellow laterally; alula greatly reduced, mesonotum violaceous and anterior collar present; post calli and notopleura with a yellowish spot.

Male: Length 9.5 mm. *Head:* Vertex feebly shining black, with a single row of short black hair. The upper occipital pile is brownish-yellow, the lower pile longer golden and almost confined to a single row. There are a few black hairs anterior to the golden ones. The front is dully shining bluish-black, the lower portion of the front deeply creased before the antennal callus which is shining black upon a deeply arcuate upper margin, but yellowish above each antennae and black in the middle. Antennae short, yellow, sharply black upon the apical third and narrowly at the top of the third joint. All of the antennal pile is black and the arista blackish. Pile of front entirely black. Face and the cheeks and the lateral portion of the lower part of the front on either side of the callus light yellow; the sides of the face are whitish pubescent, the facial pile black. The face narrows considerably below from the front and has a strong tubercle. *Thorax:* Dully shining, brownish-black with a slight greenish to brassy cast and three narrow, faint, obscure blackish vittae. Pile of thorax sparse, erect and black. There is a long, well-developed, golden, anterior collar of pile between the dark humeri and extending on the humeri. There is a light yellow spot with golden pile posteriorly on the notapleura and the posterior half of the mesopleura is yellow. All pleural pile golden. Scutellum brassy, brownish-black upon a rather distinct, equilateral triangle, the sides rather widely and the apex narrowly brownish-yellow. Scutellar pile black, with about six to eight long, ventral, golden fringe hairs. *Abdomen:* Elongate, with nearly parallel sides, dark shining sepia-brown except that the lateral margins of the second segment on the anterior half and laterally on the first segment and similar lateral margins on the third segment and fourth segment are light yellow, diffusely merging with the dark brown. The pile of the abdomen is appressed and blackish and there are no well-defined opaque areas, although a considerable portion of the middles of the segments might be described as subopaque. *Legs:* Anterior and middle femora and their tibiae and the basal three joints of their tarsi light yellow, the apical third of the femora tinged with brown, the pile blackish except upon the basal portion of the very arcuate front femora and apical half of their tibiae. Distal joints of tarsi brownish. Hind femora dark brown on apical third, lighter in the middle and almost yellowish at base, the pile black. Hind tibiae quite straight, slender, and dark brown with thick short black pile. First and second joints and their pile light yellowish or reddish-brown; apical joints darker. *Wings:* Wholly and uniformly tinged with brown. Alulae quite narrow, almost absent.

Female: Similar to the male in most respects, the third joint of the antenna more extensively blackish, the middle of the front broadly black, the post calli yellow, the thorax has the same yellow spot on notapleura and the same distinct pattern on scutellum. The anterior collar of pile is also present and the abdomen is similar. The lateral pile of the first segment is long and like the male chiefly golden with a few black hairs posteriorly. *Wings:* Similar, but darker, the male perhaps being slightly teneral. The alula, however, is better developed but long and with straight posterior border, about the same width throughout. It is not quite twice as wide as the basal part of the costal cell.

Holotype: male. Puyo, Oriente, Ecuador, 1000 meters, Dec. 3–15, 1938 (F. M. and H. Brown collectors). In the collection of Dr. C. L. Fluke. Allotype: female. Dos de Mayo, El Porvenir, Cam. del Pichis, Peru, July 6, 1920. In Cornell University collection.

Baccha (Pipunculosyrphus) tiarella n. sp.

Related to *globiceps* Hull, this species is characterized by the connected fascia of the abdomen, the dark greenish-black mesonotum, the margins of which in front of the suture are widely yellow, the yellow scutellum and the presence of narrow alulae.

Female: Length 8.5 mm. *Head:* Vertex shining black with a single row of black hairs; the front is black, obscured by brassy-brown pubescence throughout the middle and golden pubescence on the sides. The antennal callus is not prominent, is yellowish, polished brown anteriorly, and connected in the middle to an anterior, medial, black dot. Pile of front black, upon the yellow face and cheeks whitish. Sides of face white pubescent. The tubercle is well developed, the face not narrowed below. The antennae are orange and narrowly blackish above on the third joint; arista blackish. *Thorax:* Metallic black and slightly brassy with a wide, light yellow stripe from the suture laterally and including the whole of the humeri and its inner margin. The post calli are light brown, the scutellum and the whole of the pleura light brownish-yellow with pale yellow pile. The scutellar pile, however, is long, very sparse, and black in color; also with five or six pale ventral hairs. Mesonotum brownish. *Abdomen:* Flattened with nearly parallel sides, barely narrower basally; it is light yellowish-brown for the most part, marked with opaque, brownish-black fascia and yellow, broadly V-shaped fascia as follows: upon the middle of the second segment a rather narrow, arcuate, yellow fascia not reaching the sides, it is bordered anteriorly by a somewhat more narrow opaque brown band, leaving the anterior portion of the segment pale translucent yellow; the sides of the first segment are similarly yellow, its anterior border brown. There is a wider, opaque brown fascia upon the second segment behind the yellow fascia, whose lateral ends are narrower; none of these fascia reach the side margins. Apical portion of the segment shining reddish-brown. Third segment similar except that there is only a narrow, yellow, basal area in front of the first opaque fascia. Fourth segment similar to the third, the posterior margin of the posterior black fascia indented medially. Fifth segment with central, opaque black vittae reaching only as far as the wide, posterior, shining blackish margin. The remainder of the anterior two-thirds of the segment is yellowish-brown except for the lateral margin and except for a short, oblique extension of this brown into the yellow subbasally from the sides. *Legs:* First four legs entirely light brownish-yellow. Hind legs yellow on the basal third of the femora, orange on their basitarsi and brown on the remainder. The basitarsi appear darker above on account of the dark brown pile. *Wings:* Nearly hyaline and elongate, the stigmal cell light brown, the alulae present but quite narrow and about as wide as the basal portion of the costal cell.

Holotype: female. Nova Teutonia, Brazil (Fritz Plaumann).

Baccha hirundella n. sp.

Related to *clarapex* Wiedemann, the anal cell is wholly brown, the ventral scutellar fringe is black, the scutellar discal pile is exceptionally sparse and black, and the proportions of the abdominal segments are different.

Female: Length 9 mm. *Head:* Vertex and front moderately shining black with a slight bluish cast and black pile; the sides of the front are narrowly and sharply light yellow and the yellow continues downward and slightly widens upon the sides of the bluish-black and white pubescent face. The pile upon the lower part of the face is whitish but black near the antennae, the cheeks black and white pubescent. The antennae are wholly brownish-black, the arista short, basally thick and blackish. The antennal callus is not protuberant and is rugose and black above with a large, central, black spot in front preceded by yellow above each antennae. The frontal pile is black; upper occipital pile black; occiput bluish-gray, pubescent and white pilose in at least two rows. *Thorax:* Dull black with obscure, narrow, brownish, faint vittae in the middle and greyish pubescence laterally. There is a very low, inconspicuous, anterior collar of pile evanescent however throughout the middle; it might better be described as absent. Lateral margins of the mesonotum metallic. There is a pale yellow stripe posteriorly on the mesopleura and upper sternopleura, whitish pubescent and whitish pilose. Scutellum dark, reddish, sepia-brown with quite sparse, short black pile. I cannot discern any ventral fringe hairs. *Abdomen:* Petiolate, widest at the end of the fourth segment and scarcely less wide at its base and at the end of the fifth segment. The end of the second segment is only a little wider than its base, the segment is about two and a half times as long as its narrowest width. Sixth segment dorso-ventrally flattened, the posterior middle portion ridged and creased on either side due to the lateral flattening of the ovipositor. General color of abdomen almost black and shining; actually it is more nearly reddish sepia-brown. It is very dark on the basal half of the second segment, the middle of the third and apically on the fourth and the whole of fifth and sixth segments. There is a wide, opaque, black triangle on the third segment, a large triangular fascia on the fourth segment, which posteriorly has two clefts in it which are bluish-grey; the anterior corners of the segment are also bluish-grey. Fifth segment with medial, opaque, short, black vittae, and suggestions of similar vittae just laterally to the medial one and the area between lighter reddish-brown. Pile of the abdomen black except on sides of first segment. *Legs:* Dark brown, the apex and basal half of the first four tibiae diffusely yellowish-brown and pale yellow on the middle tibiae. The hind femora and their tibiae except the extreme apex of the former are black and black pilose. The basal two-thirds of the hind basitarsi are black and black pilose, the remaining joints almost white. *Wings:* Very strongly tinged with brown on all except the apical fourth which is hyaline. Whole of stigmal cell and costa and whole of anal cell brown. Alulae large, well developed, brown in color.

Holotype: female. Nova Teutonia, Brazil (Fritz Plaumann).

Baccha calypso n. sp.

Related to *crocata* Austen, the second abdominal segment is more flattened than cylindrical; the alula is quite narrow.

Female: Length 7.5 mm. *Head:* Eyes large, the face and front narrow. The vertex is opaque black, quite narrow, the ocelli resting on the eye margins; the vertex has a single row of black hairs, but the occiput is golden pilose behind and laterally and black in ground color. The narrow front is yellow, brownish-yellow in the middle with a slender, medial, dark brown line anteriorly knobbed on the upper half, and with just above the antennae a rather large, clear, round, black dot. The antennae are orange with a trace of brown above. The arista is blackish. Cheeks and face light yellow, with well-developed tubercle, the pile and that of front and antennae black. *Thorax:* Moderately shining, brownish-black upon the disc of the mesonotum with a pair of wide, laterally diffuse, submedial, yellowish pollinose vittae and between these vittae a more narrow, similar vittae. The area in front of the scutellum is widely yellowish pollinose. The sides of the mesonotum are broadly light yellow, the whole of the pleura are pale yellow except for a small brown spot above the posterior coxae and a posterior brown margin in front of the lateral base.

This brown stripe is interrupted by the spiracle. The scutellum is yellow, but in an oblique light appears pale or faintly brown upon the disc; its pile is very sparse, black, with a pair of longer black bristles at the apex and five or six short, black, ventral fringe hairs. *Abdomen:* Only a little petiolate; widest at the end of the third segment, but a little less wide at its base and at the end of the fourth segment. The base of the second segment is barely more narrow than the apex and the segment is approximately one and a half times as long as its apical width. The sides of the first segment are yellow. The remainder of the abdomen is chiefly brownish-yellow; although for the most part it is obscured by the preservation there is a pattern of dark brown vittae. The pile of the abdomen is entirely black and appressed, but long and bristly and rather sparse on the sides of the first segment. *Legs:* Entirely light yellow and faintly brownish-yellow upon the middle of the hind tibiae which is perhaps due to darker colored pile. *Wings:* Pale brown, a little darker, along the border of the costa upon the marginal and submarginal cells but not forming a distinct spot. Stigmal cell barely darker; the alulae narrow, and of approximately the same width as the basal portion of the costal cell, its posterior corner rectangular; the third longitudinal vein is straight and slightly turned backward apically carrying the costa with it.

Holotype: female. Orlando, Florida, Jan. 5, 1925.

Baccha io n. sp.

Elongate, spatulate species, characterized by the strongly, convexly arched third vein. Blackish-brown flies with yellow vittate and V-shaped spots. Related perhaps to *nora* Curran. Alula narrowly present.

Female: Length 10 mm. *Head:* Vertex brassy, brownish-black and narrow with a single row of blackish pile. The front is yellow with a rather broad, medial brown stripe reaching almost to the central, black dot above the antennae. Antennae orange; most of the third joint dark brown except its base. The arista is blackish, its short swollen base yellowish. The face and cheeks are yellow with pale pile above except opposite the antennae; pile of front black; tubercle of face quite low. The occiput is black and grey pubescent with golden pile. *Thorax:* The disc of the mesonotum is shining black, bright brassy along its sharp lateral border. The sides of the mesonotum, however, are widely pale yellow, including the humeri, post calli and the whole of the scutellum; the disc of the scutellum, viewed obliquely, is dark brown, but light yellow when viewed from above, its pile very sparse, long and black with four or five dark ventral hairs. The mesonotal pile is very sparse and pale and has no anterior collar. Sublaterally the blackish area becomes somewhat violaceous. The pleura are light yellow, obscurely brown upon a wide, posterior, diagonal stripe in front of the posterior spiracle. Squamae dark brown. *Abdomen:* Elongate and petiolate, brownish-yellow, marked with black which is partly shining and partly opaque as follows. The posterior border of the first segment except its corners, and all of the second segment, with some exceptions, shining dark brown. The posterior apex of the subcylindrical second segment is shining black; in front of this there are a pair of practically touching, velvet-brown, opaque triangles, the oblique, anterior margins of which are bordered with yellowish-brown. Upon the third segment the posterior border is widely shining blackish and in front there lies a transverse, opaque black fascia that is triangularly expanded in the middle so as to send forward a wide medial vittae to the base of the segment; the antero-lateral surfaces of the triangle are concave. The fourth segment is similar except that the medial vittae is slightly dilated basally and the lateral portions of the posterior opaque fascia extend anteriorly forward bluntly for a short distance. This leaves the anterior, lateral, yellow part of the segment in the form of a crude inverted V. The anterior corners of the segment are narrowly dark. The fifth segment has a pair of yellow, rather wide, but more widely separated brownish-yellow vittae that run two-thirds the length of the segment. Outside of these close to the base are short, small, diagonal extensions of yellow. The second segment is three or more times as long as its middle width; it is barely more narrow in the middle than at apex or base. *Legs:* Light brownish-orange; viewed from the end the hind femora are widely brown subapically, but more yellowish in the middle and brown again on the base; similarly their tibiae are brownish with a yellow band in the middle; the very long hind metatarsi are longer than the remaining joints and all the hind tarsi orange-brown. *Wings:* Light yellowish-brown. The alulae quite slender, narrower than the basal costal cell. Subapical crossvein sigmoid; third longitudinal vein considerably arched apically, carrying the costa back posteriorly. Stigmal cell barely darker.

Holotype: female. São Paulo, Brazil, C. de Jordão (F. Lane collector), Dec. 16, 1935. Paratype: female. Same data, Dec. 15, 1935.

Baccha cymbellina n. sp.

Characterized by the yellowish-brown triangle and V-shaped spots upon the dark brown abdomen. Related to *crocata* Austen but more slender.

> *Male:* Length 8 mm. *Head:* Vertex blackish, with yellowish-grey pubescence in front of and just behind the ocelli and the posterior portion of the vertex brassy. There is a single row of black hairs. Front, face and cheeks light yellow and narrow, the middle of the front with a light shining brown area and a tiny brown dot above the antennae. Antennae orange, the quite slender arista black, its base not thickened. Pile of upper part of face and front black and sparse. *Thorax:* Mesonotum dully shining reddish to brassy black with a pair of widely separated, narrow, very obscure, yellowish-brown pollinose vittae anteriorly. The lateral margins of the mesonotum, the humeri, post calli and scutellum light yellow. The disc of the scutellum viewed obliquely is brownish; upon its disc there are three or four extra long black hairs and there are also three to four long, slender, apical, fine dark hairs; ventral fringe hairs appear to be absent. *Abdomen:* Quite slender, subcylindrical as far as the end of the third segment; dark reddish-brown marked with yellow, the sides of the first segment and its anterior margin light yellow. Upon the second segment just past the middle there are a pair of wide, oblique, yellow fascia which are narrowly and linearly separated at the point of approach in the midline. They are opaque black and margined behind in the middle and in the front. The apical portion of the second segment is widely shining brown. Third segment similar except that the yellow spots are now triangular, slightly indented near their posterior medial corners, a little more widely separated by opaque brown in the middle, are placed a little further forward upon the segment and anteriorly are less extensively bordered by opaque. Their length is a little over a third of the length of the segment, the fourth segment has similar lateral triangles still more widely separated in the middle and narrowly extended anteriorly to reach the base of the segment; also, posteriorly they are deeply and sharply cleft so as to give them the appearance of an inverted V. The

medial portion and the area between the clefts opaque black. Fifth segment with a pair of slender, submedial, yellowish vittae; the second segment of the abdomen is from three and a half to four times as long as its narrowest width. The pile of the abdomen is sparse, appressed and black, but longer, sparse and yellow and erect on the sides of the first segment. *Legs:* First four light yellow; hind pair yellow in middle apically and narrow at base and quite dark brown between. Their tibiae are widely dark brownish in the middle, yellowish at base and apex. *Wings:* light yellowish-brown, the third vein arched and pulled down apically due to the extension of the costa. Alulae quite slender, narrower than the basal part of the costal cell.

Female: Similar to the male, the second and third segments of the abdomen somewhat wider; this may however be due in this particular instance, in part to the extension of the tergum laterally from the sternites below it. The yellow V-shaped markings of the third and especially the fourth segment are much more deeply cleft, being almost divided on the fourth segment and there are similar deep cleft markings on each side on the fifth segment. The wings similar, but the alulae are at least as wide as the basal portion of the costal cell.

Holotype: male, and allotype: female. Santo Domingo, Ecuador, 950 meters, March 8, 1941 (D. B. Laddey).

THE PIPUNCULIDAE OF NEW JERSEY.[1]

By William F. Rapp, Jr., Chatham, N. J.

The Pipunculidae, or "big-eyed" flies as they are called by Comstock, are one of the most easily recognized families of Diptera, because of their enormous head, which is almost entirely made up of eyes. The species are relatively rare and there is comparatively little information concerning their life histories and host relationships. They are known to be parasitic upon leaf hoppers, but little is known as to their importance in biological control of injurious species.

There are two commendable papers on this family, the first by Cresson in 1911[2] and the second by Hardy in 1943.[3]

The arrangement of genera and species used in this catalogue is based upon the work of Hardy. However, in his paper, Hardy used the Meigen name of Dorilaidae rather than Pipunculidae. I cannot agree with the use of the names in Meigen's Nouvelle Classification, 1800. Since he himself never used these names in his later works, it is my belief that Meigen never intended them to be used.

The following table is a comparison of the 1909 List of New Jersey Insects and this catalogue:

	1909	1944
Number of Genera	3	6
Number of Species	13	25

I have examined material in the following collections: American Museum of Natural History (A); Academy of Natural Science of Philadelphia (P); private collection of W. F. Rapp, Jr. (R).

In addition, I have taken records from the following: Hardy, D. E., "A Revision of Nearctic Dorilaidae" (H); Smith, J. B. "Insects of New Jersey," 1909 (S).

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[1] Contribution to a New Catalogue of New Jersey Diptera, I.

[2] Cresson, E. T., Jr., "Studies in North American Dipterology—Pipunculidae," Trans. Amer. Ent. Soc., Vol. 36 (1911), pp. 267–330.

[3] Hardy, D. Elmo, "A Revision of Nearctic Dorilaidae," University of Kansas Science Bulletin, Vol. 29 (1943), Pt. 1, pp. 1–231.

Jassidophaga Enderlein.

J. pilosa (Zetterstedt).
Pipunculus pilosa Zetterstedt, Ins. Lapp. (1840), p. 579.
Randolph, June 20, 1925 (H).

Chalarus Walker.

C. spurius Fallén.
Cephalopa spurius Fallén, Diptera Sueciae, I. Syrphici (1816), p. 16.
Del. Water Gap, July 12 (S); Bamber, July 13 (S).

In Europe this species is reported to be parasitic upon *Typhlocyba rosae* L. (Hardy, 1943: 37).

Nephrocerus Zetterstedt.

N. daeckei Johnson.
Nephrocerus daeckei Johnson, Ent. News, Vol. 14 (1903), p. 107.
Forest Hill, Newark (S).

Cephalosphaera Enderlein.

C. appendiculata (Cresson).
Pipunculus appendiculata Cresson, Trans. Amer. Ent. Soc., Vol. 36 (1911), p. 296.
Morgan, August 7 (A).
C. constricta (Banks).
Pipunculus constrictus Banks, Trans. Amer. Ent. Soc., Vol. 36 (1911), pp. 306–307.
Pemberton, July 11, 1909; Wenonah, July 10, 1910 (P).

Pipunculus Latreille.

P. aequus Cresson.
Pipunculus aequus Cresson, Trans. Amer. Ent. Soc., Vol. 36 (1911), p. 293.
Riverton (P).
P. affinis Cresson.
Pipunculus affinis Cresson, Trans. Amer. Ent. Soc., Vol. 36 (1911), p. 283.
Pipunculus globosus Cresson, Ent. News, Vol. 23 (1912), p. 453.
Buena Vista (P).
P. angus Cresson.
Pipunculus angus Cresson, Trans. Amer. Ent. Soc., Vol. 36 (1911), p. 305.

Ramsey, June 16, 1916 (H).

P. ater Meigen.

Pipunculus ater Meigen, Syst. besch. der bekannten europ. zweifl. Ins., IV (1824), p. 23.

Pipunculus cingulatus Loew, Centuria VI, Berl. Ent. Zeit., 9 (1865), p. 176.

Pipunculus fuscus Cresson (nec. Loew), Trans. Amer. Ent. Soc., Vol. 36 (1911), p. 301.

Pipunculus horvathi Kertesz, Ann. Musei Nationalis Hungarici (1907), V.P. 579.

Pipunculus townsendi Malloch, Proc. U. S. N. M., 43 (1913), p. 292.

Pipunculus campestris Verrall, Brit. Flies, Vol. 8 (1901), p. 99.

Pipunculus dentipes Meigen, Syst. besch. der bekannten europ. zweifl. Ins., Vol. 7 (1838), p. 146.

Pipunculus dispar Zetterstedt, Ins. Lapp., Vol. 3 (1840), p. 579.

Pipunculus wolfi Kowarz, Wien. Ent. (3), Vol. 6 (1886), p. 152.

Forest Hill, Newark (S).

Hardy (1943: 76) claims that this species is commonly associated with *Phlepsius irroratus* (Say) *Forcipata sp.,* and also with an Agallian leafhopper on oak.

P. atlanticus Hough.

Pipunculus atlanticus Hough, Proc. Bost. Soc. Nat. Hist., Vol. 39 (1899), p. 80.

Manhawkin (P); Clementon, May 17 (P); Branchville, June 6, 1932 (A); Newark, June 14 (S); Riverton, June 18 (S); Brown's Mills, July 4 (S).

P. caudatus Cresson.

Pipunculus caudatus Cresson, Trans. Amer. Ent. Soc., Vol. 36 (1911), pp. 289–290.

New Jersey (H).

P. caudatus var. *discolor* (Banks).

Pipunculus caudatus var. *discolor* Banks, Trans. Amer. Ent. Soc., Vol. 36 (1911), p. 290.

Branchville, May 23, 1931 (A).

P. fuscus Loew.

Pipunculus fuscus Loew, Centuria VI, Berl. Ent. Zeit., Vol. 9 (1865), p. 175.

Pipunculus cingulatus Cresson, Trans. Amer. Ent. Soc., Vol. 36 (1911), p. 299.

Trenton, July 7 (S); Wenonah, June 23 (S).

P. fuscus var. *nitidiventris* (Loew).

Pipunculus nitidiventris Loew, Centuria VI, Berl. Ent. Zeit., Vol. 9 (1865), p. 175.

Pipunculus sororius Cresson, Trans, Amer. Ent. Soc., Vol. 36 (1911), p. 305.

Pipunculus viduus Cresson, Trans. Amer. Ent. Soc., Vol. 36 (1911), p. 301.

Riverton, Sept. 14 (S); Trenton, May 20 (S).

P. minor Cresson.

Pipunculus minor Cresson, Trans. Amer. Ent. Soc., Vol. 36 (1911), p. 293.

Trenton (P); Cape May (P); Morgan, Aug. 16 (A).

P. nigripes Loew.

Pipunculus nigripes Loew, Centuria VI, Berl. Ent. Zeit., Vol. 9 (1865), p. 176.

Pipunculus dubius Cresson, Trans. Amer. Ent. Soc., Vol. 36 (1911), p. 284.

Pipunculus winnemannae Malloch, Proc. U. S. Nat. Mus., 43 (1913), p. 655.

Glassboro, May 23 (R); Riverton (P); Newark, Sept. (S); Clementon, Oct. 4 (S); Buena Vista, June 10 (S).

P. pallipes Johnson.

Pipunculus pallipes Johnson, Ent. News., Vol. 14 (1903), p. 107.

Pipunculus houghii Cresson, Trans. Amer. Ent. Soc., Vol. 36 (1911), p. 308.

Type locality, Aug. 27 (S); Cape May (P); Branchville, June 5, 1932 (A); Trenton, Aug. 21 (S); Brown's Mills, May 13 (S).

P. reipublicae Walker.

Pipunculus reipublicae Walker, List of Dipt. Ins. in British Mus., Vol. 3 (1849), p. 639.

Pipunculus albofasciatus Hough, Proc. Bost. Soc. Nat. Hist., Vol. 29 (1899), p. 85.

Ramsey, June 12, 1915 (A); Westville, Aug. 13 (S).

P. subopacus Loew.

Pipunculus subopacus Loew, Centuria VI, Berl. Ent. Zeit., Vol. 9 (1865), p. 176.

Pipunculus confraternus Banks, Trans. Amer. Ent. Soc., Vol. 36 (1911), p. 285.

Pipunculus occidentalis Malloch, Proc. U. S. Nat. Mus., 43 (1913), p. 291.

Glassboro, June 20 (R); Newark, July (S); Riverton, June 1, July 19 (S); Clementon, May 30 (S).

P. hertzogi (Rapp).

Dorilas hertzogi Rapp, Ent. News, Vol. 54 (1943), p. 118.

Glassboro, June 21 (R).

Tomosvaryella Aczel.

T. coquilletti (Kertesz).

Pipunculus coquilletti Kertesz, Ann. Musei Nationalis Hungarici, Vol. 5 (1907), p. 582.

Pipunculus proximus Cresson, Trans. Amer. Ent. Soc., Vol. 36 (1911), p. 318.

New Jersey (H).

T. unguiculatus (Cresson).

Pipunculus unguiculatus Cresson, Trans. Amer. Ent. Soc., Vol. 36 (1911), p. 319.

Pipunculus sachtlebeni Aczel, Zoöl. Anzeiger 1. 12, Bd. 132, Heft 7/8 (1940), p. 152.

Hardy (1943: 173) considers this as *T. sachtlebeni,* but I believe that Cresson's name *P. unguiculatus* has priority over Aczel's name.

New Jersey (H).

T. similis (Hough).

Pipunculus similis (Hough), Proc. Bost. Soc. Nat. Hist., Vol. 29 (1899), p. 84.

Riverton (P); Trenton (P); Clementon (P); Westville (S).

T. subvirescens (Loew).

Pipunculus subvirescens Loew, Centuria X, Berl. Ent. Zeit., Vol. 16 (1872), p. 87.

Pipunculus pilosiventris Becker, Berl. Ent. Zeit., Vol. 45 (1900), p. 233.

Pipunculus aridis Williston, North American Fauna, 7 (1893), p. 255.

Pipunculus albiseta Cresson, Trans. Amer. Ent. Soc., Vol. 36 (1911), p. 318.

Pipunculus insularis Cresson, Trans. Amer. Ent. Soc., Vol. 36 (1911), p. 317.

Pipunculus metallescens Malloch, Proc. U. S. Nat. Mus., 43 (1913), p. 298.

Pipunculus knowltoni Hardy, Jour. Kans. Ent. Soc., Vol. 12 (1939), p. 20.

Cape May (P); Riverton, June, July (S); Delair, Aug. 14 (S).

Hardy (1943: 179) has found this species a very abundant one affecting leafhoppers in Bermuda grass. According to Ashmead[4] this species is parasitic upon *Draeculacephala versata,* but this has not been confirmed.

T. sylvatica (Meigen).

Pipunculus sylvaticus Meigen, System Besch., IV (1824), p. 20.

Pipunculus scoparius Cresson, Trans. Amer. Ent. Soc., Vol. 36 (1911), p. 317.

Pipunculus hirticollis Becker, Deut. Ent. Zeit., Berlin, 1910, p. 657.

Morgan, July 19, July 30, Aug. 7, Sept. 12 (A).

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[4] Ashmead, "Notes on Cotton Insects Found in Mississippi," Insect Life, Vol. 7, p. 326.

Sinea diadema Feeding Notes.—An adult spined soldier bug, *Sinea diadema* (Fabr.), was observed to be feeding upon an adult syrphid fly, *Asemosyrphus mexicanus* Mg., while resting on the blossoms of a rabbitbrush, *Chrysothamnus nauseosus,* southeast of Brigham City, Utah, September 30, 1942. An adult *S. diadema* on the same species of rabbitbrush near Rock Candy Mountain, Piute County, Utah, September 7, 1943, was feeding on the aphid, *Capitophorus oestlundi* Knlt., on a leaf below the blossoms of the plant. A male *S. diadema* was found while feeding on an alfalfa weevil larva at Provo, Utah, June 9, 1942. A female *diadema* adult was observed feeding on an alfalfa caterpillar, *Eurymus eurytheme* (Bdv.) in an alfalfa field on Milford Flat, Utah, June 11, 1943. At Greenriver, Utah, June 26, 1943, a *S. diadema* was collected together with 43 pea aphids, 3 *Nabis alternatus* Parsh., a 5-spotted and a 13-spotted ladybird beetle and a number of alfalfa weevil larvae, in one sweep of the insect net on alfalfa. The *diadema* was feeding on an adult wingless *Macrosiphum pisi* (Kalt.) when collected, which it continued to feed upon and drag about at the end of its beak for several minutes. When placed with the collected living insects in a 3-ounce tin ointment can, it was found to be feeding upon an alfalfa weevil larva about 15 minutes later. The next time the can was examined, the *diadema* and also a *Nabis alternatus* were both feeding on pea aphids. A large nymphal *S. diadema* was found feeding on a nearly full-grown alfalfa weevil larva in an infested alfalfa field at Beaver, Utah, July 8, 1943. Three miles north of Fillmore, Utah, July 21, 1943, a *diadema* was collected while feeding on an aphid, *Capitophorus elongatus* Knlt. on rabbitbrush, *C. nauseosus,* on a leaf just below the apex of a top twig.—G. F. Knowlton, Utah Agricultural Experiment Station, Logan.

Some Insect Food of the Two-spotted Collops.—Adult two-spotted collops beetles, *Collops bipunctatus* Say, frequently are abundant in Utah alfalfa fields infested with pea aphids. On several occasions these beetles have been observed to feed ravenously on *Macrosiphum pisi* (Kalt.) under field conditions. An apterous *Aphis medicaginis* Koch on an alfalfa plant at Junction, June 11, 1942, was eaten while a collops was under observation. At St. George, May 6, 1943, a *C. bipunctatus* ate a wingless green peach aphid, *Myzus persicae* (Sulzer) ; this aphid was abundant enough to be damaging and probably was responsible for transmitting mosaic, observed in some seed beets. In addition, six species of adult ladybird beetles, numerous ladybird larvae, some aphis-lion larvae and Chrysopidae adults, besides numerous *Orius tristicolor* (White) and *O. insidiosus* (Say) were present, helping to reduce this aphid population. The convergent ladybird was especially abundant. Along a roadside 4 miles southwest of Kanosh, in an area infested by Mormon crickets, two-spotted collops were abundant on roadside Russian-thistle, *Atriplex, Amaranthus* and knotweed, on July 8, 1943. One of these predaceous beetles captured and ate all but parts of the wings and legs of a knotweed psyllid, *Aphalara calthae* (L.), in three and one-half minutes. After making insect-net sweepings in an alfalfa field at Torry, July 19, 1942, a *C. bipunctatus* was seen to seize and quickly eat one of the mature wingless *Macrosiphum pisi* aphids also collected in the sweepings. On July 20, 1943, a male *C. bipunctatus* was observed feeding on an aphid, *Aphis medicaginis* on alfalfa at Hinckley; another collops fed on a leafhopper nymph (probably of *Aceratagallia sanguinolenta* Prov.). The same day 7 collops were taken in 5 sweeps at Deseret. Careful observation of one specimen walking around on the grass resulted in seeing it eat a small aphid, *Rhopalosiphum prunifoliae* (Fitch). The beetle just walked up and began feeding on the abdomen of this plant louse. These collops also were abundant on nearby *Bassia hyssopifolia.* In Skull Valley, July 30, 1943, a male two-spotted collops was found feeding voraciously on a wingless adult *Aphis helianthi* Monell, while facing a colony of these aphids on the underside of a sunflower leaf. Examination of aphid-infested wheat at Stone, Idaho, August 7, 1943, disclosed these collops to be rather common on the infested heads; while eating a *Rhopalosiphum prunifoliae,* the female predator stood head downward during its gluttonous feeding.—George F. Knowlton, Utah Agricultural Experiment Station, Logan, Utah.

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BULLETIN

OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

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BULLETIN

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A NEW GENUS—TENUISANUS—AND SPECIES OF MEXICAN LEAFHOPPER (HOMOPTERA, CICADELLIDAE).

By Dwight M. DeLong, Department Zoology and Entomology, Ohio State University.

Genus **Tenuisanus** nov.

In general form resembling *Mesamia* and apparently related to it. The vertex is thin and foliaceous, strongly bluntly produced and flat on the disc. The venation is simple and there are no costal veinlets or supernumerary veinlets as in *Mesamia*.

Genotype: **Tenuisanus costatus** n. sp.

Tenuisanus costatus n. sp.

Resembling a species of *Mesamia* in general form but dark brown and with distinct genitalia. Length, male 6 mm.

Vertex strongly produced, rounded at apex, about one and one-half times as wide between eyes at base as median length, margin thin and foliaceous.

Color dark brown above with margin of vertex and costal margin of forewings yellow. Face and beneath bright yellow.

Genitalia: Male plates elongate and narrow, apices pointed. Style broad at base, rapidly narrowed to form a narrow, curved apex. Aedeagus long and rather slender with a pair of very short processes at apex extending ventrally and caudally and a longer pair extending dorsally and anteriorly. At the basal end of the aedeagus it curves dorsally and caudally. A broad, long process arises near the base of inner margin of pygofer on either side and extends to apex. The inner edge of apical half appears serrate.

Holotype male collected at Iguala, Gro., September 11, 1939, by C. C. Plummer and the author.

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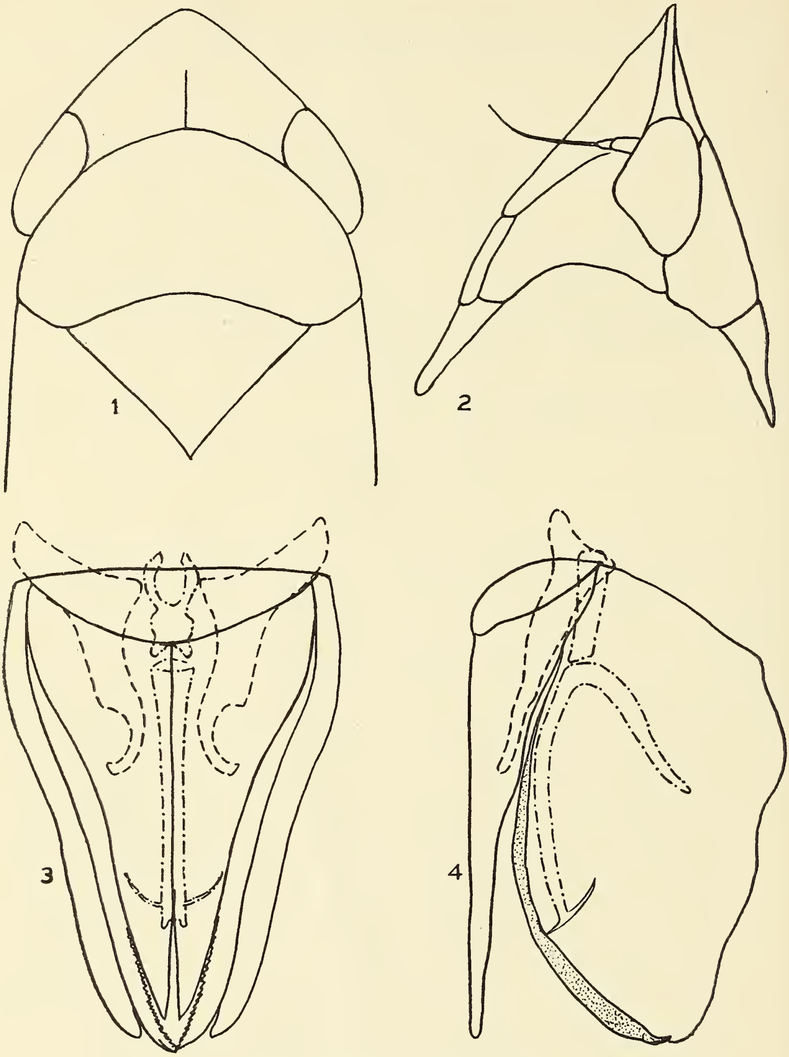

Explanation of Plate.

Tenuisanus costatus.

Fig. 1. Dorsal view of head and pronotum.
Fig. 2. Lateral view of head and pronotum.
Fig. 3. Ventral view of male genitalia.
Fig. 4. Lateral view of male genitalia.

SOME NEW FORMS OF PLATYCHEIRUS OF THE FAMILY SYRPHIDAE.

By F. M. Hull, University of Mississippi.

While making a study of the genus *Platycheirus,* the following flies were discovered which appear to be distinct from North American and European species of this interesting genus.

Platycheirus flabella n. sp.

Characterized by the black legs, slender anterior tibia and moderately expanded yellow, basal two tarsal joints of the fore legs. Related to *discimanus* Loew.

Male: Length 8.5 mm. *Head:* The vertex and front and face shining black, the latter with a faint bluish cast and bluish-white pubescence and all with black pile; the pile is rather thick and long upon the upper half of the front. The antennae are black, the third joint is perhaps slightly brownish, its arista black. The tubercle of the face is well developed, sharp, laterally compressed, slightly concave above and deeply concave below; the face and epistoma are produced forward considerably, though not as much as in *manicatus* Meigen; the scutellum and pleura are shining black, the sides of the former and most of the latter thinly dusted with white pubescence. The pile of the mesonotum is erect, long and chiefly black with a few light brown and a few almost whitish hairs in the middle of the anterior portion. The pile of the scutellum is very long and sparse. The mesopleural pile is black but is whitish on the sternopleura. *Abdomen:* Moderately shining black, faintly greenish, becoming brassy on the lateral margin. On either side, and in the middle of the second segment there are small, oval, yellowish-brown spots separated from the lateral margin. There are similar spots upon the third and fourth segment lying close to the base of the segment. The pile of the abdomen is yellowish along the sides, short, appressed and black in the middles of the segments. *Legs:* Black, the narrow apices of the middle tarsal joint brownish, the extreme apex of the anterior femora and extreme base of its tibiae brownish and the first two tarsal joints of the front tarsi are light brownish-yellow, their remaining tarsal joints dark brown. The first tarsal joint is as long as the next three, gradually widening towards the apex where it is a little more than twice as wide as its base; the second joint is considerably less wide than the apex of the first and is but little wider than long. There is a row of regularly spaced, long, black bristles upon the outer, lateral surface of the front tibiae on the apical half and five or six shorter ones on the basal half. The posterior margin of the anterior femora has a row of irregularly spaced, long, black, hairs throughout most of its length. There is no basal black or white hair.

Holotype: a male. Mt. Ranier, Washington, July 1926 (F. M. Hull, collector).

Platycheirus chirosphena n. sp.

Characterized by the almost wholly black hind femora and the widely black, black pilose hind tibia. Related to *podagratus* Zetterstedt and *erraticus* Curran.

Male: Length 9 mm. *Head:* The vertex, face, front and occiput bluish-black; the front is widely covered, except just before the antennae, with whitish pubescence which extends widely over the face to leave only the rounded low tubercle and the cheeks bare. The pile is everywhere black except on the lower part of the occiput. The antennae are black, the arista brownish-black. *Thorax:* Mesonotum shining bluish-black, more brassy on the posterior part of the mesonotum and upon the scutellum, and particularly so in front of the scutellum. The pile of the mesonotum is sparse and yellowish white with abundant similar pile upon the mesopleura and pteropleura. The pile of the scutellum is longer on the margin, is short and whitish on the disc and yellowish upon the margin. *Abdomen:* Elongate, slender and a little narrower upon the third and fourth segments; it is shining black with a very faint bluish cast, especially upon the first and second segments. There is a pair of small, transversely oval, very widely separated, orange spots on the second segment that begin at or just beyond the middle and are therefore closer to the posterior border and narrowly separated from the lateral margins. The third segment has much larger, less widely separated, bright orange spots lying almost upon the base of the segment; their medial margins are broadly rounded and these spots reach the base laterally and almost reach the lateral margin. There are similar spots which are not quite so long upon the base of the fourth segment. The pile of the abdomen along the sides is yellowish-white, but is blackish over most of the black area. *Legs:* First four legs light yellowish-brown; the middle femora are darker brown on the posterior surface, the anterior tibiae yellowish-white distally and upon the first basi tarsi. The hind femora are black almost throughout with an extremely narrow, limited trace of yellow upon the narrow base where it joins the trochanter and the narrow apex yellowish. The basal sixth, and the apical sixth or less, of the hind tibiae are yellowish-brown, their middles blackish and widely black pilose. The hind basitarsi are black, black pilose and rather thickened except at the ends. The second and third joints and their tarsi are yellowish-brown, the apical joints dark. The middle femora ventrally have three long black hairs in the middle and also posteriorly along the middle of the posterior margin on the apical half there is a row of long, fine dark hairs. The pile of their tibiae is inconspicuous except for a row of brown, curly hair along the anterior edge which disappears upon the apical fifth. The anterior tibiae are gradually widened; the first joint of their tarsi is moderately wide and the remaining joints gradually decrease. The discal anterior margin of the anterior tibiae and the adjacent margin of the first tarsal joint are blackish; the anterior femora have a single, long, white, basal, posterior hair and ventrally near the base four to five, widely spaced, long, black, bristly hairs. *Wings:* pale brownish hyaline, the stigmal cell yellowish.

Holotype: a male. Oliver, British Colombia, May 6, C. Garrett.

Platycheirus pauper n. sp.

Related to *discimanus* Loew. Characterized by the gray dusted, aeneus spots of the abdomen, the posterior black border of the front tibia and the very narrowly dilated anterior tibia.

Male: Length 7 mm. *Head:* The vertex is shining black and black pilose with considerable golden pile behind on the occiput. Front brassy-black, partly obscured by sparse grey pollen; the pile is thick, quite long and black. The face is short with a quite small tubercle, is quite low and is metallic black with sparse grey pubescence and long black pile. The first two joints of the antennae are black, the third reddish-brown to black; the arista is short, strongly thickened and dark brown. *Thorax:* Mesonotum shining black, bright brassy widely upon the sides; the pile is yellowish-brown, abundant and long. Pleural pile yellowish. Scutellum and its pile concolorous with that of the mesonotum but more reddish-golden and a little longer. *Abdomen:* Slender, a little narrower past the long second segment; the second segment is feebly shining black and bright brassy upon the sides but is without either aeneous or hoary or yellowish spots. The third segment has a pair of longer than wide, widely separated, subrectangular, hoary greyish spots that are bright brassy towards the sides. The yellowish-grey pollen of these spots is more apparent when viewed posteriorly. The fourth segment has similar, equally large basal spots and the fifth segment throughout both its middle and sides is brassy-black. Hypopygium brassy black. Pile upon the sides of the abdomen pale, sparse, very short and narrowly blackish through the middle. *Legs:* All of the femora are shining black and very narrowly light brown at their apex; the hind tibiae are widely black through the middle, the basal third and extreme apex yellowish-brown, their pile short, but golden even on the black areas. Pile of hind femora golden, the first four joints of their tarsi brownish-black the last joint brown. The middle tibiae have a short brown annulus just past the middle antero-ventrally; these tibiae have a row of short, curled, dark brown hairs that are more abundant throughout the middle and disappear near the apex. Middle tarsi brownish-yellow. Middle femora with three or four long, slender black hairs posteriorly upon the apical fifth. The anterior tibiae are brownish-black along their antero lateral margins but become light reddish near the base and whitish quite close to the apex. On the medial anterior margin the apical fifth or more of the tibiae is white and the remainder of this and the anterior surface yellowish-brown. These tibiae are only slightly dilated apically but the expansion is gradual throughout the length. The anterior tarsi are entirely light brownish-yellow, very little widened and flattened, the first joint is a trifle longer than the next two joints and scarcely if any wider. *Wings:* Strongly tinged with brown, the stigmal cell brown.

Holotype: a male. Trail Ridge Road, Colorado (M. T. James).

Platycheirus thylax n. sp.

Related to *discimanus* Loew. Face very wide and inflated; anterior tibia yellow at apex and widely at base, not dilated. The disk of the tarsus consists of only the first two segment.

Male: Length 6.5 mm. *Head:* The vertex is bluish-black and black pilose. The front is also bluish-black with long, dark brown or black pile. The face is exceedingly wide and swollen and inflated with small but sharp tubercle and protuberant epistoma. There are deep creases ending in a puncture on the lower side of the face upon the eye margins. The cheeks are wide but very short and swollen. *Thorax:* Mesonotum and pleura shining bluish or greenish-black with thick, brown pile. Scutellum very dark brown with slight greenish cast and long, thick, brown pile. *Abdomen:* Slender, dark, dull brown, more shining along the sides, without spots on the second segment but with a trace of reddish, obscure, small spots basally upon the sides of the third and fourth segments. *Legs:* The middle and posterior legs are light brown; the middle tarsi are slightly more yellowish. The anterior femora are also brown and without special hairs at the base; upon the posterior margin there are four or five, very slender, rather long, reddish-brown hairs upon the middle area that begin fairly close to the base. The apex of the femora and the basal third of their tibiae and the narrow apex of their tibiae are diffusely and obscurely light yellowish. The anterior tarsi are whitish on the anterior surface; the first joint is longer than the next three joints and almost as long as the remaining four; it is quite flattened and considerably widened and regularly expanded towards its apex. The second joint is almost as wide as the first joint and is twice as wide as long. The first three joints are whitish with whitish pile, the last two brown. There are three, small, brown spots and a narrow, bent, black line and a longitudinal, marginal, brown stripe anteriorly upon the ventral surface of the first tarsal joint. The anterior tibiae are simple and not dilated.

Holotype: a male. Alymer, Quebec.

Note.—In order to enable Dutch scientists to acquaint themselves as soon as possible after hostilities cease with the various publications in scientific papers which do not reach them at present, and to assist them in establishing still closer contact with British and American science than existed before the war, the Netherland Government Commission for Scientific Documentation has been constituted. Dr. J. H. De Boer, Professor in the Imperial College of Science and Technology (London) is Chairman and Ir. A. F. H. Blaauw, Unilever House, London, is Hon. Secretary. A depository library of the Commission has been established in the United States, c/o Mr. F. Verdoorn, Chronica Botanica, Waltham, Mass.

SYLVATIC PLAGUE: A NOTE ON THE FINDING OF LARGE NUMBERS OF FLEAS ON GROUND SQUIRRELS (GOPHERS) IN ALBERTA.

By John H. Brown, University of Alberta,
Edmonton, Alta.

The Richardson Ground Squirrel.

The Richardson ground squirrel, *Citellus richardsonii* Sabine, is the common prairie "gopher" and it is well distributed throughout the Great Plains area of Alberta.

Sylvatic plague infection was first demonstrated in this ground squirrel in Alberta in 1939. Since that time investigations have shown that a plague epizootic of serious proportions is now present over an area of 2,000 square miles in the Hanna-Youngstown district of southeastern Alberta. Plague-infected ground squirrels have also been located on an area of 36 square miles in the Suffield region of southern Alberta.

Observations made in connection with the sylvatic plague survey show that there is undoubtedly a definite relationship between the number of fleas per animal and epizootic plague in Richardson ground squirrels. This relationship has not been exactly determined as yet but is still in the process of being investigated. Information so far secured indicates that many other factors, such as the density of the ground squirrel population, the presence or absence of predatory and scavenger birds, and the carrying out of control operations, also have a direct bearing on this relationship. When all of these factors are understood and evaluated correctly there is no doubt but that a "critical flea index" will be arrived at that can be applied to any area with the certain knowledge that it will determine the presence or absence of plague in the Richardson ground squirrel.

In 1939 the Alberta Sylvatic Plague Survey became interested in a "critical flea index" as a means for locating plague infection in ground squirrels. Since that time a great deal of information has been secured. In preliminary investigations a "critical flea index of 2" was arrived at and this was applied in the field during 1941 and 1942 with a fair measure of success. It must be remembered, however, that the "critical flea index of 2" is only a temporary measure and will be revised as more information is obtained.

The Richardson ground squirrel does not live in colonies but is widely scattered over the prairie. They are very active animals and travel widely with the consequent opportunities for contact with each other. When epizootic plague occurs large numbers of them die, and usually they die on the surface of the ground. Being so placed the fleas, as soon as the host's body becomes cold, leave and seek a living animal as host. With the great activity of the remaining ground squirrels there is ample opportunity for the fleas to transfer to a new host. This new host would then be harboring its own quota of fleas plus those that transferred to it from the dead animal, or in other words its "flea index" would be higher. If the epizootic was very severe with a high fatality rate amongst the ground squirrels, the remaining animals would have a very high "flea index."

In order to determine a "critical flea index" that could be utilized as an indicator of a plague epizootic it was first necessary to determine the "normal flea index." Eskey and Haas (1), working in California, reported that their examination of 2,416 Richardson ground squirrels showed that the average number of fleas per animal was 1.63. In the five-year period, 1938 to 1942, inclusive, the Alberta Sylvatic Plague Survey shot and trapped 6,264 Richardson ground squirrels. These animals yielded 11,139 fleas, or an average of 1.78 fleas per animal. The nearness of this average number of fleas per animal to that found by Eskey and Haas indicates that the "normal flea index" is approximately 1.7 fleas per animal.

While attempting to establish a "normal flea index" a number of ground squirrels were collected that yielded exceptionally high numbers of fleas per animal. These numbers were of such magnitude that it was believed that they would be of interest to other workers in this field. It is of particular importance that all of these animals were collected in known or suspected plague areas.

1. In 1940 three Richardson ground squirrels taken in a known plague area yielded 13, 18 and 42 fleas each. The animal harboring the 42 fleas was taken in the center of the epizootic area.

2. In 1942 three animals, taken as one collection with the fleas pooled, yielded 71 fleas. These animals were taken on the periphery of the epizootic area. Another collection of two animals taken in the same year yielded a pool of 133 fleas. These animals were taken in a suspected, but as yet unconfirmed, plague area. A third collection of one animal taken in a then unknown, but since confirmed, plague area yielded 30 fleas.

3. During 1940, 1941 and 1942 a number of ground squirrel collections showed a flea index ranging between 2 and 10. Practically all of these collections were made in the plague area at Hanna-Youngstown.

The Columbia Ground Squirrel.

The Columbia ground squirrel, *Citellus columbianus,* is common in the mountain and foothill regions of Alberta. It is usually referred to as the Mountain gopher. This animal lives in colonies and its range is restricted. Plague has not been found in this animal in Alberta.

During the period 1938 to 1942 inclusive, the Alberta Sylvatic Plague Survey shot and trapped 508 of these animals. The total yield of fleas was 1,291, or an average of 2.54 fleas per animal. Eskey and Haas (1) report that their examination of 2,277 animals of this species showed that the average number of fleas per animal was 2.20.

There was very little variation in the number of fleas taken from individual animals in Alberta. Most of them yielded around 2 fleas per animal, but in 4 collections the average number was 6 and in one collection the average number was 7 fleas per animal.

Reference.

1. **Eskey, C. R.** and **Haas, V. H.** Plague in the Western Part of the United States. U. S. Pub. Hlth. Bull. (254): 30–31; 1940.

Cannibalism in Herbivorous Insects.—Some time ago my brother sent me a live coral snake, which finally died because it refused to eat. Among the insects offered to it were some *Tenebrio molitor.* When the snake was found dead, the skin had been gnawed and the flesh beneath had been nibbled in two places. The beetles had been without food for some time because there was only sand in the cage, and the snake. This is not the first time I have observed a phytophagous insect become creophilous temporarily. Captive specimens of *Melanoplus* without vegetable food have eaten their dead fellows.—Cyril E. Abbott, Independence, Iowa.

W. JUNK AND HIS WORK.

By J. R. de la Torre-Bueno, Tucson, Ariz.

On another page we comment on the death, evidently under obscure circumstances, of Dr. William Junk, who was established in Holland at the time of the invasion. All of us who have purchased books abroad will always bear him in kind memory for his ever courteous and helpful service in supplying our needs.

But Dr. Junk went far beyond being a fine book-seller—he was also a publisher of notable entomological works. His great monument is the vast undertaking, the *Coleopterorum Catalogus,* of which 160 parts in 31 volumes had been published up to 1938, with 4 parts in press and 3 others in preparation. All these parts are by outstanding students of the various families, including Gestro, Olivier, Schenkling, Dalla Torre, Pic, Arrow, Clavareau, Jeannel, Horn, Hatch. Where are these great workers today?

Edited by F. Bryk was the *Lepidopterorum Catalogus* in 33 vols., 84 parts already issued, 4 in press and 9 in preparation. In this also cooperated the best-known lepidopterists such as Aurivillius, Pagenstecher, Strand, Meyrick, Prout, Busck, and many others equally important.

Other catalogues in initial numbers were the *Hymenopterorum Catalogus,* 7 parts published; and the *Orthopterorum Catalogus,* 1 part published.

In another line is the *Fossilium Catalogus* which had reached 79 parts in the animals and 22 parts in the plants; it includes the completed list of the Palaeolithic and Mesolithic Hominidae, by W. & A. Quenstedt. The last part of the *Animalium Cavernarum Catalogus,* by B. Wolff, was in press according to the latest report (1938). This was part 14 of the 3-volume work.

Junk also reprinted a few of the out-of-print fundamental works, as those on Diptera by Loew, Rondani and Brauer & Bergenstamm.

This short notice has for its purpose to point out *one* of the great losses that entomology has suffered in the course of this devastating war. As more of the European Continent regains communication with the rest of us, we shall doubtless learn of other and as sad losses.

This notice is in no way a bibliography nor a critique; its sole purpose is to point out how deeply this world struggle penetrates and affects our cloistered and peaceful science of entomology.

ORIUS FEEDING RECORDS.

By G. F. Knowlton, Logan, Utah.

An *Orius tristicolor* (White) was noticed feeding on a nymphal *Aphis minutissima* G.-P. on *Artemisia* in Oak Creek Canyon, Utah, July 10, 1942. At Hurricane, May 4, 1943, an *Orius insidiosus* (Say) was observed to feed on a thrips, *Frankliniella occidentalis* (Perg.). Both *O. insidiosus* and the blacker *O. tristicolor* were abundant on alfalfa; also among the great numbers of flower thrips, *Frankliniella occidentalis* (Perg.), present on seed sugar beets at Hurricane and St. George. In one heavily infested beet field at Hurricane, approximately 90 per cent of the *Orius* present were *insidiosus* (det. R. I. Sailer). In an alfalfa field southwest of Payson, *O. tristicolor* averaged 4 per semi-circular sweep of the insect net on June 9, 1943. One specimen under observation began feeding on a one-third-grown alfalfa weevil larva. Two days later, in an alfalfa field on Milford Flat, Beaver County, where *tristicolor* averaged 3, and pea aphids were from 35 to 100 per semi-circular sweep, a second instar *Macrosiphum pisi* (Kalt.) nymph was being fed on by a *tristicolor*. An *O. tristicolor* was observed feeding on a second instar aphid, *Rhopalosiphum pseudobrassicae* (Davis) on turnip leaf at Logan, June 20, 1943, in the writer's garden. In an alfalfa field at Beaver, on July 8, 1943, a *tristicolor* was feeding on a western flower thrips, *Frankliniella moultoni* Hood, on an alfalfa blossom; another *tristicolor* fed on a clover mite. These minute pirate bugs often become abundant on alfalfa, and are especially numerous on blossoming rabbitbrush which always is heavily infested with western flower thrips and in addition usually supports smaller numbers of one to three other thrips species, at the time *Chrysothamnus* is in full bloom. At Riverdale, on August 5, and also at Lehi, September 14, 1943, an adult *tristicolor* was seen feeding on a flower thrips on sunflower. A week later a *tristicolor* was observed feeding on a mullein thrips, *Neoheegeria verbasi* (Osb.), in Allen Canyon. Ten miles north of Moab, and west of the Arches National Monument, on September 16, 1943, *Chrysothamnus nauseosus* bushes in full bloom were heavily infested with western flower thrips, and also by a smaller, paler thrips, with an abundance of *O. tristicolor* present on the flowers; and a few aphids, *Macrosiphum escalantii* Knlt. occurred on the stems just beneath. Two of the predators were observed feeding on western flower thrips and one on a second instar *M. escalantii*. Collections with the insect net yielded from 5 to 21 *tristicolor* and an estimated 500 to 2500 or more thrips per sweep of the net on full bloom rabbitbrush; fewer thrips or *Orius* were present on these plants after they passed the peak of bloom and only a few were found on bushes not yet in blossom. While collecting, large numbers of the thrips got upon the clothing, face and arms of the writer, causing distinct annoyance by crawling about on the skin, especially of the ears, neck and face, for approximately two hours after the collecting and observations occurred.

An *O. tristicolor* was found on a leaf of willow, between Ogden and Riverdale, October 3, 1942, while feeding on a wingless aphid, *Chaitophorus viminalis* Monell. *O. tristicolor* adults and nymphs often were moderately abundant on aphid infested carrots at Logan during the past season, and on July 1, 1943, one was observed, feeding on a wingless *Cavariella capreae* (Fab.). At Spanish Fork, Utah, June 25, 1943, a *tristicolor* was feeding on a bean thrips, *Heliothrips fasciatus* Perg., in a bean blossom. It discarded its prey when disturbed during the observation.

Some Insect Food of the Chickadee.—Five long-tailed chickadees, *Penthestes atricapillus septentrionalis* (Harris), were collected from hawthorn and chokecherry in Utah at Cove, September 10, 1940. An examination of their stomach contents revealed the following insects present: 10 Collembola in two stomachs; 10 Hemiptera including 7 nymphs, and 2 *Nysius ericae* (Schill.), all stomachs contained at least one hemipterous specimen; approximately 4,260 aphids including *Clavigerus bicolor* (Oest.), *Periphyllus negundinis* (Th.), *Aphis bakeri* Cowen, *A. cerasifoliae* Fitch, *Macrosiphum ludovicianae* (Oest.), *M. pisi* (Kalt.), *Capitophorus xanthii* (Oest.), and *Myzus persicae* (Sulz.); additional Homoptera included 16 scale insects in three stomachs, 12 Adelgidae, *Chermes cooleyi* Gill. and some of its eggs in one stomach; and 26 Coleoptera including 4 flea beetles, three weevils and 3 ladybird beetle larvae (*Scymnus?,* waxy coated). The species found indicated that the birds had fed to some extent upon aphids of sagebrush, willow, cockle-burr and probably among alfalfa. A sixth chickadee, collected on a telephone pole near willows and meadow at Mendon, Utah, September 26, 1940, contained 8 Chironomidae adults, 1 large leafhopper, and two tiny beetles.—George F. Knowlton, Utah Agricultural Experiment Station, Logan.

ENTOMOLOGICAL TRIVIALITIES AND PERSONALITIES.

By Phil Rau, Kirkwood, Mo.

A Hottentot God.

The honeybee is regarded as sacred by many primitive peoples, and the Scarabeid-beetle even unto this day is held in high reverence by the Egyptians, but the Praying Mantis is the only insect, so far as I know, that has been elevated to the high status of a god. The Hottentot god, Cagn—that benevolent deity of the African Bushman—is incarnated, so the story goes, in the Praying Mantis, Ngo. Because of its size and its strange shape, many persons have treated this not only harmless but beneficial insect with superstitious awe.

Insects apparently are not very popular among primitive peoples as objects of worship, although a great many mammals, fish, reptiles, and birds have held various positions in the sacred rites of many tribes.

One needs only to look into the peaceful face of our own companionable little *Stagmomantis carolina* to feel how well she and all her kin deserve to be held in such high regard.

Incidentally, let this be said for the Hottentots—they have not created a god in their own image but have chosen one of tangible beauty and living interest.

Cockroach versus Roach.

During the past few years I have written several papers on various species of cockroaches. Recently I discovered that I used the terms *roach* and *cockroach* interchangeably. This should not be. Only one should have been used. Which one?

Neither Webster nor the New Century Dictionary could help me, for I find both terms are applied to one and the same thing. Webster says the word *roach* is derived from *cockroach.* The latter therefore has priority and, I think, should be used in preference to *roach.* But how did the use of *roach* come about?

H. L. Mencken, in his book *The American Language,* solves the mystery for us. He not only tells us how the word was changed but also why. *Cockroach* is one of the forbidden words, one of the naughty words. He says:

> "Victoria was not crowned in England until 1838, but a Victorian movement against naughty words had been in full blast in our country since the beginning of the century. James

> Flint reported in his "Letters from America" that *rooster* has been substituted for *cock* (the latter having acquired an indelicate anatomical significance) by 1821. At the same time *haystack* began to supplant *haycock* and *roach* to supplant *cockroach.* A bit later a young man in Judge T. C. Haliburton's book, 'Sam Slick,' was telling a maiden that her brother had become a *rooster-swain* in the navy."

The present generation has gone back to cockswain in the navy, so too let the entomologist go back to cockroaches in the kitchen. (oh, no– Bro. Rau.—Ed.)

NOT CATERPILLARS, REALLY?

Here is an excerpt from an editorial in *The St. Louis Star-Times* (August 23, 1943) during an epidemic of caterpillars.

> ". . . what might have been a pleasant weekend was utterly spoiled by the caterpillars. The squishy, white, six-legged insects were all over the place for a second time this year—or so it seemed. . . . We hasten to report that the things really are not caterpillars but fall web worms. . . . Caterpillar eggs [sic] will not hatch until they have been exposed to freezing temperature. Unfortunately, the web worm is more prolific. One of the easiest ways to tell the difference between caterpillars and web worms. . . ."

and so on, ad infinitum.

This, then, is the price we pay for not educating our editorial writers!

INSTINCT.

Little Benny's essay on "Instinct" was syndicated in the newspapers about 20 years ago.* Articles of this sort in the press live but a day. This essay is rescued for a longer life by being reprinted below, not only because it is funny, but because the same muddled thinking about instinct goes on today in the minds of a large population of big Bennys, little Bennys, and also their teachers.

> "Today in school Miss Kitty was telling us about animals being born with instincts on account of nature being so wonderful and everything, Miss Kitty saying, Look at the berds, you couldn't have a more striking example than the berds. They have no callenders and no compass and no maps, and yet at the ferst sines of winter they rise in a body and low and behold

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* A series of essays on children, entitled "Little Benny's Notebook," under the authorship of Lee Pape. (These may now be had in book form.)

with unerring precision they fly southwerd to warmer climes. Now what wonderful thing do they possess that makes them capable of such an amazing feet? Miss Kitty said.

"Wich Shorty Judge waved his hand saying, A swell sense of direction, and Miss Kitty said They have much more than that, because even human beans have been known to have remarkable sense of direction, such as the Indians in the trackless forrests. Berds have an instinct, that's what they have, a marvellous strange instinct wich for millions of years has told them when and where to migrate for self preservation is the ferst law of nature, and now if there are no questions we will go on the arifmetic period.

"Being bad news, and us fellows mades sines to each other to ask questions and use up more time, and I waved my hand, saying, Would the other berds follow their leader if he made a mistake and started to fly east, or would they start to argew with him or would they just keep on going south by their own private instincts?

"There can be no such thing as a mistake, nature is too wonderful, Miss Kitty said, and Shorty Judge waved his hand, saying, Well in case the leeder just did happen to get stuck on account of being absent minded, would he ask the other berds what they thawt?

"I just got through explaining that such a situation is impossible, and now unless somebody has a sensible question we will drop the subjeck, Miss Kitty said. Well, Raymin, what is it? she said, and Raymin Levy said, Do they ever catch a hitch by taking rides on clouds that happen to be going the same direction?

"How many boys in this class consider that a sensible question? Miss Kitty said, and everybody raised their hand and Miss Kitty said, Such a class, we will go on to arifmetic.

"Wich we did."

Viva instinct!

ENTOMOLOGY 1a.

I once knew a man who would punctuate his entomology lectures with stories and jokes, but after a few years he became so proficient as a teacher that he could completely dispense with them—probably to the relief of his students.

He reminded me very much of a struggling shopkeeper I knew long years ago who kept his customers similarly entertained while he weighed thirteen ounces to the pound; but when he became wealthy and could afford to give honest measure, he quit telling them funny stories!

Getting a Job.

A young friend applied to the head of the entomology department in a certain school for a teaching position.

He did not get the job; this he thinks was due to the fact that he spent most of the time talking about his own interests and enomological ambitions, when really he should have spent the time discussing the professor's.

A Portrait of a Butterfly Collector.

We have had in our midst for many years a butterfly collector who thought himself a very great naturalist. He had but little solid learning, and this he stretched to the utmost in attempting to impress you with his importance as a student of nature. In fact, he often stretched it far too far, and when he underestimated the intelligence of his audience, as he often did, it snapped back and hit him full in the face.

He began collecting butterflies many years ago—at a time and in a city when the doing of even such a small thing was sufficient to give him a certain kind of distinction. The local newspapers in those days exploited him and his collection in several fully-illustrated feature articles, and these to a large extent were responsible for the exaggerated opinion he held of his own attainments.

Newspaper accounts of this kind often attract pilgrims to one's door, and he, like many another, had gotten his quota of frivolous as well as serious ones on various ages. These he always welcomed with glowing enthusiasm and to these he gave help to the fullest of his limited ability; and if they did not grow beyond his mental stature, they eventually became his satellites, of which he always had a large number. But it sometimes happened, albeit on rare occasions, that one or another of these neophytes in time attained eminence in his chosen field. But as soon as he outshone his mentor —alas! he was lost to him forever.

He had the field pretty much to himself for a long, long time, but as the years went by, other men (some of them with impresive biological backgrounds) usurped his sphere of endeavor, and when his prestige waned, his butterfly collecting also lagged. His interest, however, in meetings and field outings of several of the nature clubs never abated; he attended sessions and often pompous and lengthy discourses rolled from his lips, many of which proved to be nothing more than an exposition of the obvious.

He also loved to look the part of a naturalist, this man of overweight, with an air of exaggerated importance, and his field clothes were chosen and a demeanor was cultivated with that end in view. He once conducted a nature hike over the hills, and a member of the partly described him to me in this way: His clothes fitted him properly, and although they were only of brown khaki, they were immaculately creased; his coat had many pockets, his riding breeches were tucked neatly into his high-cut boots, and his felt hat was of a shade of brown to harmonize with the outfit. He stood on the veranda of the summer hotel, in the midst of the dozen or so whom he was to guide over hill and dale, through swamp and dry creek bed—insect net in one hand, large poison jar in the other, a canvas bag slung over one shoulder, field glasses over the other—in all his glory—Naturalist *de luxe*.

He once told me of an incident and showed me some camera shots of a vacation trip he took which seemed to me to be symbolic of his whole life: "This photograph," he said, "was taken at the Shrine of John Burroughs. The man you see who only got partway into the picture is me. My! you should have seen how I had to run to get into the picture, and I barely made it half-way."

A pathetic figure, withal: he dreamed intensely of being a great naturalist, and blindly mistook his dreams for reality.

A Night at Pietramala.

Do you know Aldous Huxley's "A Night at Pietramala"? It is only a dozen or so pages in length and can be found in W. Somerset Maugham's anthology entitled *A Traveler's Library*. It should be read and pondered over by the older naturalists to sustain them in their quest for truth, as well by biology students, who will benefit by Huxley's thoughts in an inspirational way.

There is a romantic side to the study of biology and also to the men who have made the science what it is today; but, alas! in the mad rush to cram students' heads with scientific facts, this aspect of biology is lost sight of. Factual information is important, but in the making of a great naturalist, the emotional and the dramatic sides are equally important.

If I were a biology teacher, I should not only ask my students to read Huxley's essay but also ask them to commit certain passages of the inspiring essay to memory. One cannot but be deeply moved by the paragraphs on "Michael Faraday" or "Unimaginative Men" and also the part of it commencing "If I could be born again and chose what I should be in my next existence, I should desire to be a man of science," and then he tells beautifully and feelingly why he would rather be a Michael Faraday than a Shakespeare.

Today in high schools and colleges, biology has lost its flavor for many students; this I am sure is because their professors do not know Aldous Huxley's "A Night at Pietramala" and other essays like it. Some day, when a book of Scriptures is compiled for nature students, Huxley's work will have the first place.

The Novelist as Zoologist.

It is with real satisfaction that one notes that occasionally William Morton Wheeler's work on social insects, with its many human implications, has penetrated the world outside of science. In Aldous Huxley's novel, *Point, Counter Point,* one finds a passage as follows:

> "Since reading Alverdes and Wheeler I have quite decided that my novelist must be an amateur zoologist. His approach will be strictly biological. He will be constantly passing from the termitary to the drawing room and the factory and back again. He will illustrate human vices by those of the ants, which neglect their young for the sake of the intoxicating liquor exuded by the parasites that invade their nests. His hero and heroine will spend their honeymoon by a lake where the grebes and ducks illustrate all the aspects of courtship and matrimony. . . . The mass of intricately copulating snakes will remind the libertine of his orgies. Nationalism and middle-classes' religious love of property will be illustrated by the male warbler's passionate and ferocious defense of his chosen territory. And so on. . . ."

Effect of Vacua on Water Beetles.—Specimens of *Dineutes* and *Gyrinus* confined in a small aquarium, when set under a vacuum pump and subjected to a reduced air pressure for ten minutes, exhibit a temporary increase in activity and finally become entirely quiescent. The beetles become normally active within five minutes after normal conditions are restored. Exhaustion of the air probably was not complete in the experiments, although the pump is capable of exhausting a glass tube sufficiently to produce ionization of the residual gas.—Cyril E. Abbott, Independence, Iowa.

A NOTEWORTHY UNDESCRIBED CRANE-FLY FROM TROPICAL AMERICA (DIPTERA, TIPULIDAE).

By Charles P. Alexander, Amherst, Massachusetts.

In a collection of Tipulidae from South and Central America belonging to the United States National Museum and kindly sent to me for determination by Dr. Alan Stone, a most outstanding new crane-fly was found. This large and handsome fly belongs to the genus *Pselliophora* Osten Sacken, all other species of which are restricted to the Oriental, eastern Palaearctic and extreme western Australasian regions. Many years ago, Dr. P. Speiser (*in litt.*) mentioned that he had seen a *Pselliophora* from Central America but apparently he has never recorded this in print.

It should be observed that this is the first record of a member of the subtribe Ctenophoraria in the Neotropical Region. The only genus in the group that occurs in the western United States and Canada is *Malpighia* Enderlein, quite distinct from the present fly. How the *Pselliophora* reached Central America provides a problem in geographical distribution that is not readily answerable at the present time.

Pselliophora mesamericana sp. n.

General coloration orange, the thorax unpatterned; antennal flagellum black, the extreme tip of the axis of the basal segments more reddened; all flagellar branches with abundant pale pubescence; outer pair of branches about three-fourths the length of the basal pair; legs black, the central portion of the tibiae a trifle brightened; wings butter-yellow, with two broad dark brown crossbands, the outer one apical, the other before the level of origin of *Rs;* a small brown axillary spot; abdomen yellow, the posterior borders of the segments orange; a single large median black area on tergites five to seven, inclusive.

Male: Length about 20 mm.; wing 18 mm.; antenna about 7 mm.

Frontal prolongation of head short, orange throughout; palpi obscure yellow, the terminal segment darkened on outer portion. Antennae (male) with the scape obscure yellow; pedicel and first flagellar segment dark fulvous brown; remainder of antennae black, the extreme apices of the segments a little reddened; outer pair of flagellar branches shorter than the basal pair, approximately three-fourths as long and a trifle more slender; all branches densely clothed with an erect pubescence.

Head orange; vertical tubercle scarcely developed; a small darker spot adjoining inner margin of eye immediately behind each antennal fossa.

Thorax uniformly orange, without pattern. Halteres orange, the stem weakly darkened. Legs with the coxae and trochanters orange; remainder of legs black, the central portion of tibiae vaguely brightened. Wings handsomely patterned with dark brown on a butter-yellow ground, the dark including two major complete crossbands, the outer one involving the apex as far basad as the level of the cord, the extreme base of cell *1st* M_2 and the proximal half of cell M_4 remaining of the yellow ground; second dark band nearly parallel-sided or slightly more widened in the cells of posterior half of wing, the outer margin of band reaching the origin of *Rs,* the inner edge the distal sixth or seventh of cell *2nd A;* in addition to the darkened bands, a large brown axillary spot in cell *2nd A;* veins orange-yellow in the ground, more blackened in the dark areas. Venation: *Rs* long and nearly straight, nearly three times the arcuated *m-cu;* cell M_1 very short-petiolate to barely sessile.

Abdomen yellow, the segments more orange on their posterior portions; a large median black area involving tergites five to seven, inclusive; posterior border of tergite four confluent with this marking but paler; hypopygium obscure orange. Male hypopygium relatively small and short, cylindrical, slightly uptilted; ninth tergite with the caudal border narrowly bordered by black and weakly toothed, the most distinct denticles on either side of a shallow median emargination. Dististyles heavily blackened, the expanded tips with numerous blackened spines to produce a mace-like effect.

Habitat: Guatemala, Central America.

Holotype: ♂, Cayuga, August (*Schaus & Barnes*); type in United States National Museum.

The discovery of a true *Pselliophora* in the New World adds still another to the constantly increasing list of Old World genera and subgenera of Tipulidae that are being discovered in Tropical America. Compared with the very numerous (about 80) species of the genus in the Old World, the present fly is abundantly distinct in the wing pattern which is different from any other species known to me. Members of the genus show a considerable range in variation of body and wing coloration within a single species and it is therefore very possible that the present fly will be found to vary somewhat within a series of specimens.

SPHAERIDINI INHABITING BOREAL AMERICA.

By Fred Winters, Santa Barbara, Calif.

Dactylosternum abdominale Fabr.,[1] a species recorded by Dr. Horn from Florida and Carolina, was kindly compared by Mr. Henry Dietrich with specimens from the collection of Mr. Charles Schaeffer. He found my specimens from Santa Barbara to agree with those from Alabama. My specimens were taken in decaying vegetable matter in company with *Cercyon haemorrhoidalis* Fabr. and *Cryptopleuron americanum* Horn, all new records for our California fauna.

Heteryon luniger Mann.,[2] a species recorded by Dr. Horn, has thus far been given as *Cercyon*. This is Dr. Sharp's original description:

"Although the characters of the obscure little insect for which I propose this name are somewhat anomalous, there can, I think, be no doubt that it should be placed at the commencement of the *Cercyon* group of genera. It has the appearance of a small *Dactylosternum,* but the exserted labrum and the peculiar armature of the mesosternum are more like what we find in the Hydrobiini. The mesosternum has in the middle an elongate but very slightly elevated longitudinal carina, and in front of it a slightly more prominent angle; this is similar to what exists in the genus *Berosus,* except that the development is less. The two individuals examined have been in a very dirty condition; but I am pretty certainly right as to the structure of the tarsi, although I am not very sure as to the number of the intermediate joints of the antennae; this, however, is unimportant, the formation of these organs being quite of the *Dactlyosternum* type, with rather more compact club."

This species looks very much like a depressed *Dactylosternum,* has the 5th segment *not* carinated. The mesosternum is as described by Dr. Sharp, lineate, not broadened at its upper surface, and the antennae are 9-jointed.

Cercyon (*Paracercyon* Seidl) *analis* Payk.—This species can be easily separated because it has a narrow opening in the mesosternum to correspond with a sharp angular extension of the mesosternum. This species is represented in Dr. Horn's collection, but has so far been overlooked. It appears to be an introduced species from

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[1] Horn, Trans. Am. Ent. Soc., 1890.

[2] Blackwelder, Pan-Pacific Ent., 1931, p. 23.

Europe, common in Ardsley-on-Hudson, and in Secaucus, N. J., in decomposed vegetation.

Cercyon analis, referred to by Dr. Fall, is a new species, extending from the East to Vancouver, Canada, which I take great pleasure in renaming **Cercyon falli** Winters, nom. nov. Dr. Fall did a great deal to put order in the genus *Cercyon.* The record of *Cercyon falli* from Vancouver is from an identification by Dr. Fall, and must be right; the meso- and metathorax are as described in Dr. Horn's Table U–9. *Cercyon quisquilius* Linn. has been recorded from Virginia to California. *Cercyon pratextatus* Say, a species common in detritus has also been found by Hugh B. Leech in Vancouver, and by myself near Riverside, Calif.

Fluorescence in Ephemerid Larvae.—The gills of certain ephemerid larvae *fluoresce* in ultraviolet light. In a room absolutely without visible light this peculiarity is very striking. Only the gills are visible under such conditions.—Cyril E. Abbott, Independence, Iowa.

EDITORIAL.

Peace—and War

Of set purpose our publication has avoided reference to the horrible struggle for life, this destroying war, in which all are sunk—men, women, children, rich and poor, learned and simple. We have felt that there must be an oasis of peace, where we can retire to refresh our torn spirits, such as our publications, established in peace and flourishing in peace. As this is written, the last fell battle for peace and justice is just begun. To those whose sons and brothers, husbands and fathers are in peril by sea and on land and in the air; to us who are suffering from the spiritual anguish of heart-breaking anxiety, there is nothing left but a spiritual refuge, in prayer for those that believe, in intellectual constructive activities for others. And this is the function of science, especially of the study of the manifestations of life in its endless phases. Our own science of entomology is a bright spot of peace and quiet. But even we, in our peaceful country, are touched directly or indirectly, either by the absence of our younger men in the armed services, or by the turning of our studies and our knowledge to mitigate the hazards of war in every part of the world, from the very battle front to the solitude and silence of the deep jungle.

Casualties there have been, and irreparable losses; here is the notice recently received of one of these:

"It is with deepest sorrow and regret that we have to inform you of the death on December 3rd 1942 of our beloved parents

Dr. & Mrs. Wilhelm Junk

the former scientific publishers of the Hague Holland and both citizens of the Republic of Czechoslovakia. Their death in the Hague has only just been communicated through the Netherlands Red Cross and the circumstances of their death are unknown to us.—Stephanie Schweitzer-Junk, Dr. Hans Schweitzer, Frank Schweitzer.—March, 1944—Saxons, Yester Road, Chiselhurst, Kent."

We wonder where our friends in the occupied countries are—Dr. Bouvier, Dr. Jeannel and all that outstanding group in France; where are the Belgians, the Dutch, the Danes, the Czechs—a heavy cloud of fear covers all.

Let us hope for the liberation of those poor enslaved spirits, our friends. But how many have escaped to live for future work? Our victory alone can answer this question, but perhaps most grievously for so many of them.

J. R. T.-B.

BOOK NOTES.

Dune Boy—The Early Years of a Naturalist, by Edwin Way Teale. Pp. i–vii + 1–255. (Dodd, Mead & Co., New York. $5.00.)

This present writer's attitude toward an anticipated Teale book is of pleasurable expectancy. In this author we have a revealer of the intimacies of Nature in the same advanced rank as Gilbert White and Thoreau.

To do justice to "Dune Boy" demands a flow of fervid language beyond our limited vocabulary. The story of the little boy that was carries in its glad pages an undertone of sadness—the nostalgia of advancing years for the vanished, care-free days of happy, untroubled childhood and youth, whom each passing day brings closer to the pot of gold, always following the gorgeous rainbow of dreams. This nostalgia is quite normal for a staid old grandfather, like him that writes these lines; but it is hard to associate with a young man at his very prime, reaching surely to the heights, as is our author. For pure pleasure, read "Dune Boy," which so beautifully expresses the unvoiced thoughts of so many of us. Once more retread the daily path that led to something new, something in its essence enthralling, something that forms the weave of the happiest days of our lives.

And coming down to the drab daily fare, it should be said that in this, as in his other fascinating works, Teale is accurate; he does not distort a fact to make a flowing phrase.

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These Book Notes, in their stated purpose, are briefly to mention such works as come in to the Editor and appear to be of value or of interest to our readers. Here follow several monographs and other papers of extended scope or treatment, with or without comment.

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Insetos do Brasil, 4° tomo—capitulos XXIV a XXVII—**Panorpatos, Suctorios** (pulgas), **Neurópteros, Tricópteros,** by A. da Costa Lima. Pp. 1–141, figs. 1–96. Escola Nacional de Agronomía, Rio de Janeiro, Brasil. (Not priced.)

This is a continuation on the same high plane of the general work on Insects of Brazil. The letter-press as always is excellent, the figures fine. Our only comparable work is "Insects of Connecticut," begun by the late Dr. W. E. Britton.

The Generic Names of the British Hemiptera-Heteroptera, with a check list of the Brtish species; part 8 of The Generic Names of British Insects, prepared by the Committee on Generic Nomenclature of the Royal Entomological Society of London with the assistance of the Department of Entomology of the British Museum (Natural History). Royal Entomological Society of London. (L1 19s. 0d.)

This is a most valuable contribution to hemipterous nomenclature, which will doubtless be the norm for British hemipterists for a long time to come. A true critical review of this work is out of place here. The report itself gives the bases on which it operated; and the work should be construed in their light. But this is not said to diminish its real importance in any way.

The Genus Conotrachelus Dejean in the North Central United States, by Herbert Frederick Schoof. Pp. 1–170, 9 plates. Contributions from the Entomological Laboratories of the University of Illinois, no. 223. The University of Illinois Press, Urbana. 1942. ($1.50.)

It is very imperative from time to time to gather together and correlate sections of the vast mass of material on the various insect groups. Dr. Schoof has done this most acceptably, and above all, most usefully, for the genus **Conotrachelus.** The writer, knowing nothing about Coleoptera, can have no valid ideas as to any of the facts established nor on the status of the conclusions. But, having seen much, the form of presentation appeals to him for utility. Coleopterists will doubtless make all the necessary emendations each deems called for.

On the Classification of the Histerid Beetles, by Rupert L. Wenzel. Zoological Series, Field Museum of Natural History. Volume 28, number 2, pp. 51–151, plates 1–9. (Not priced.)

Here is a revision of a group of beetles which has drawn the attention of many non-coleopterists in the field. And here, also, our preceding remarks apply. Dr. Wenzel has given his fellow-students a useful work.

* * * * * *

It is most encouraging to find that even in the turmoil of war there are men who can still follow the intellectual pursuits of peace, and who are thus performing the urgent duty of preserving our imperilled heritage of culture.

J. R. T.-B.

Vol. XXXIX OCTOBER, 1944 No. 4

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OF THE
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BULLETIN

OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

Vol. XXXIX October, 1944 No. 4

THE TRIBE CENCHREINI WITH SPECIAL REFERENCE TO THE CENCHREA COMPLEX (HOMOPTERA, DERBIDAE).

By John S. Caldwell, Circleville, Ohio.

At present the generic complex of *Cenchrea* and related groups is on dubious ground. The contemporary workers' knowledge is limited to the fact that *Herpis* Stål is characterized by a median facial carina, *Cenchrea* Westwood by a short subcostal cell, and *Phaciocephalus* Kirkaldy by a long cell. It would be a gross exaggeration to assume that this is even half the story or that the set up is thus simple. No one can be sure whether two or a half dozen generic groups are involved.

No person should have had a clearer concept of this complex than Frank Muir. Not only had he seen a wealth of material but he was privileged to have examined many of the historic types. It is hoped that this paper may make a little clearer the generic concepts held by Muir since interpretation of genera and species herein contained are based on a study of his material and types available in the H. Osborn collection. All types are tentatively retained by the writer unless stated to the contrary in the script.

Until proved different I cannot see how any one can dispute the statement that *Herpis* Stål and *Syntames* Fowler are the same.[1] *Herpis* Stål represented by *Syntames sufflavus* Muir and *S. chiriquensis* Fowler (*nigrolineatus* Muir) both have a median facial carina, but not necessarily for full length, and the lateral carinae are thin and delicate. The medius is five- or six-branched and the veins Cu_1 and Cu_{1a} may or may not join before the wing margin. The aedeagus is bilaterally symmetrical, the medio-ventral process of the male pygofers is simple and usually small, and the forceps do not possess an acute inner basal tooth. Belonging in this group

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[1] Muir, F., Proc. Ent. Soc. Wash., No. 1, 26: 16, 1924.

NOV 29 '44

are *fusco-vittata* Stål, *delicatus* Fowler, *chiriquensis* Fowler, *sufflavus* Muir, and *albidus* Metcalf, and possibly *fuscus* Metcalf but this species may belong elsewhere since no mention is made of a median facial carina.

Muir evidently had some doubt that *Cenchrea* Westwood was distinct from *Phaciocephalus* Kirkaldy but never, as far as I can find, differentiated the two other than to state that the former had a short subcostal cell and the latter a long cell. Unfortunately such a key character by itself permits one wing of a species to fall in one genus and the other wing in another genus. After examining " *P. ? bipunctata*" Muir I am also at loss to know just what constitutes a long or short cell.

Phaciocephalus Kirkaldy represented by *parishi* Muir (and *P. ? bipunctata* Muir) has a rather narrow and deeply incised crown and face with the lateral carinae heavily pustulate. The aedeagus appears to be bilaterally symmetrical. (The genitalia were not cleared but the forceps in both types are spread enough to permit a relatively good view of the aedeagus.) Perhaps the best description is obtained from Kirkaldy[2] by following the key characters since the original description is nil. "Last segment of labium annuliform. Anal vein of tegmen granulate. Pronotum laterally laminate, sinuate, recurved, partly enclosing antennae; vertex not truncate anteriorly., Lateral keels of frons flattening out apically." *Basileocephalus* is differentiated by having the lateral keels of frons continuing to apical margin. Kirkaldy's figures of the type species *vitiensis* (Pl. XIX, Figs. 12–14) show crown and facial characters very similar to *parishi* Muir. On the same plate (Fig. 20) is figured the entire specimen of *miltodia* which gives some idea of the wing venation. The first claval vein (Anal vein of tegmen) appears granulate. The text figure (No. 3, 3a, p 166) of the elytra of *vitiensis* is according to "F. Muir, 4/3/17" in a note to H. Osborn, in error and should read *"Suva koebelei."* Thus from the evidence presented by Muir and Kirkaldy we have to conclude that some American and South Pacific species are congeneric until such time as a study of the phallic characters should prove otherwise. Unfortunately the present conception of *Phaciocephalus* as represented in the Western Hemisphere contains at least three distinct generic groups.

The first represented by *parishi* Muir with rather narrow and deeply incised crown and face and possessing a symmetrical aedeagus.

---

[2] Kirkaldy, Report of the work of the Experiment Station of the Hawaiian Sugar Planters' Association—Leafhoppers—Supplement. Bull. No. 3, pp. 163–164, 1907.

The second represented by *fuscus* Metcalf with rather broad, smooth, slightly transversely convex face, and crown scarcely incised, and possessing a symmetrical aedeagus.

The third represented by *uhleri* Ball with crown and face separated by a more or less distinct ridge and the lateral margins elevated and heavily pustulate, and possessing an asymmetrical aedeagus.

Herpis fusco-vittata Stål (Pl. I, Figs. 1, A, & B)

This specimen tentatively determined as Stål's species is similar in appearance to *delicatus* Fowler but the fuscous markings are broader and the placement is different. There is a fuscous dash present between the claval veins, another along the cubitus extending a little beyond the fork thence proceeding diagonally to the costal and apical margins. The apex of the cubitus is also broadly fuscous. The median facial carina may be too prominent to be this species after Muir's statement of a faint carina.

Unique male from Coroico, Bolivia (H. Osborn collection).

Contigucephalus n. gen.

Vertex deeply incised caudad, flattening cephalad. Lateral carinae of frons very thin, elevated, contiguous in basal half, separating and flattening apically, sharply incurved to clypeus. Clypeus weakly tricarinate. A small rounded papilla present on side of face below apical margin of eye. Pronotum tricarinate just caudad of vertex; with antennal foveae well developed. Mesonotum appearing tricarinate. Elytra and wing of equal length; clavus closed, subcostal cell very short; venation similar to *P.* ? *bipunctata.* Aedeagus of male bilaterally symmetrical.

Type: **Contigucephalus rubravenosus** n. sp.

C. rubravenosus n. sp. (Pl. I, Figs. 5, A– D)

Length 4.5 – 5 mm. General color light yellow to white with black eyes. A scarlet stripe present basad across elytra and mesothorax, another stripe present across furcation of main veins, and a large scarlet spot present at apex of clavus extending almost half way across the elytra. Apical veins broadly red and a stigmal-like spot present in the apex of the fifth or sixth medial cell.

Lateral margins of male pygofers cut away basad; medio-ventral process very small. Forceps with basal tooth appearing to arise from dorsal margins. Aedeagus symmetrical. Caudal flap of female pregenital plate roundedly produced.

Male holotype and female allotype from Costa Rica (P. Schild). H. Osborn collection.

Phaciocephalus Kirkaldy
"fuscus group"

P. minutianus n. sp. (Pl. I, Figs. 2, A–C)

Length 5.5 mm. Head and pronotum light yellow; mesonotum deep yellow; elytra light fuscous with veins broadly white. Female darker than male.

Crown and face broad, smooth; lateral carinae thin, not prominent. Subcostal cell long.

Anal segment of male very small. Medio-ventral process of pygofers large, rectangular. Forceps long, slender, with two processes on ventral margins within. Aedeagus symmetrical. Caudal flap of female pregenital plate semicircular.

Male holotype from B. Esperanza, Guatemala, 12–14–25 (M. F. 892, Dampf), female allotype from Vergel, Chiapas, 6–19–36 (M. F. 4503, Dampf).

"uhleri group"

P. uhleri Ball (Pl. I, Figs. 4 & A, Pl. II, Figs. 1, A–C)

The basal spurs of the male forceps are serrate. The medioventral process of the pygofers is simple and rounded. Habitat southern U. S. from Georgia to Kansas.

P. brunneus McAtee (Pl. I, Figs. 8 & A)

Related to *uhleri* in that the basal spurs of the male forceps are serrate; however the medio-ventral process of the pygofers is ornate. Dr. R. I. Sailer of the U.S.N.M. has kindly sketched the ventral aspect of the holotype male genitalia and furnished the following data: U.S.N.M. type #27359. Baker #1785 Medellin State, A. Th. Heyde, 1895; #27359 Vera Cruz, Mex., H. Heyde, summer 1896.

P. mcateei Dozier (Pl. II, Figs. 2, A–C)

This species is at present separated from *fulva* Van Duzee, which probably belongs in the "parishi group," by its smaller size. The genitalia are distinct. Drawing of specimen from Georgia (P. W. Fattig).

P. texanus n. sp. (Pl. II, Figs. 3, A–C)

Length 3.5–4.5 mm. Head and thorax orange; elytra yellowish with two subapical black spots along costa.

Anal segment of male with rather long acute preapical flaps ventrad. Medio-ventral process of pygofers rectangular, slightly notched apically. Basal process of forceps simple, acute. Pregenital plate of female with rectangular caudal flap.

Male holotype, 5–8–35 (J. N. Knull) female allotype 8–8–37 (D. J. & J. N. Knull), and paratypes on both dates from Brownsville, Texas. Types in Ohio State University, Columbus, Ohio.

P. triatus n. sp. (Pl. II, Figs. 4, A–C)

Length 4–4.5 mm. Head and pronutum light yellowish; mesonotum deep orange with apex lighter caudad; elytra broadly white along costal margins thence suddenly fading to light smoky along inner margins, this fuscous stripe diffusing near the apex; apex of elytra in the females narrowly fuscous.

Medio-ventral process of male pygofers with apex trifurcate, outer extensions acute, median extension broadly rounded.

Male holotype, female allotype, and paratypes from Belice, British Honduras, 9–6–25 (M. F. 671, Dampf).

P. quadrispinosus n. sp. (Pl. II, Figs. 6, A & C)

Length 3.5 mm. Head and pronotum lighter yellow than mesonotum. Elytra milkish, apical margins infuscate; subcostal-radial stem black, remainder of veins yellowish.

Anal segment of male with a pair of large, acute, preapical flaps.

Male holotype from Huixtla, Chiapas, 6–5–35 (M. F. 4452, Dampf).

The female associated with this male is much larger, measuring 5 mm., but the markings are identical. B. Esperanza, Guatemala, 12–14–25 (M. F. 892, Dampf).

P. nigripennis n. sp. (Pl. II, Figs. 5, A–C)

Length 4.5–5 mm. Head except frons, pronotum, and legs yellow; remainder fuscous. Female darker than male with only lateral carinae of crown and face, and auricular cavities of pronotum yellow.

Anal segment of male greatly produced ventrad before acute apex. Medio-ventral process of pygofers ornate, flat apically. Basal process of forceps simple, acute. Pregenital flap of female broadly rounded.

Male holotype, female allotype, and paratypes from Jesus Carranza, Veracruz, 10–14–41 (DeLong, Good, Caldwell, & Plummer), male paratype from Tamazunchale, San Luis Potosí, 11–5–38 (Caldwell), male paratype Finca Aurora, Chiapas, 6–13–25 (M. F. 4552, Dampf), and one paratype Huétamo, Michoacán, 8–22–33 (M. F. 3100, Dampf).

P. nigripennis var. **flavipennis** n. var.

Appearing dusky-yellow over all with orange mesonotum. Aedeagus of male differing from variety *nigripennis* by one process being of different shape and size.

Male holotype and female allotype from Tamazunchale, San Luis Potosí, 8–29–39 (F. M. & D. M. DeLong). Paratypes from Finca Aurora, Chiapas, 6–18–35 (M. F. 4552), Finca Belém, Chiapas, 7–24–35 (M. F. 4628), El Dorado, Sinaloa, 1–22–30 (M. F. 1565) and 12–23–28 (M. F. 269), Potrero, Veracruz, 10–28–24 (M. B. 100) and San José, Guatemala, 10–19–25 (M. F. 736, Dampf); Tehuantepec, Oaxaca, 10–13–41 (DeLong, Good, Caldwell & Plummer), and Escuintla, Guatemala, 3–8–42 (Plummer).

P. anastomosus n. sp. (Pl. II, Figs. 7, A–C)

Length 4 mm. Fuscous over all, slender.

Anal segment of male with knob-like preapical projections on ventral margins. Medio-ventral process of pygofers scarcely ornate. Basal process of forceps simple, acute. Aedeagus with six or more processes.

Holotype male, Lake Petén, Guatemala, 11–19–25 (M. F. 811, Dampf).

P. punctus n. sp. (Pl. II, Figs. 8, A & C)

Length 4.5 mm. Head and pronotum light yellow, remainder of thorax orange. Elytra whitish becoming dusky apically, apical cells next to costa fuscous.

Anal segment of male long, scarcely produced on ventral margins before apex. Medio-ventral process of pygofers simple, slightly enlarged apically. Basal spur on forceps simple. Caudal flap of pregenital plate of female appearing truncate apically.

Male holotype from Tamazunchale, San Luis Potosí, 9–25–41 (DeLong, Good, & Caldwell), female allotype same locality, 9–14–39 (DeLong), one doubtful female from Santa Engracia, Tamaulipas, 11-11-38 (Caldwell), and one from Veracruz, 10-9-41, (DeLong, Good, Caldwell & Plummer).

P. dubius n. sp. (Pl. II, Figs. 9, A-C)

Length 6-7 mm. Head and pronotum light. Lateral carinae of face black. Mesonotum orange. Elytra whitish with costal margin broadly infuscate, especially apically.

Anal segment of male straight, long. Basal spurs of forceps rather large, scarcely acute apically. Aedeagus asymmetrical, with basal processes. Caudal flap of female pregenital plate elongate, truncate.

Holotype male from Finca Victoria, Chiapas, 6-25-35 (M. F. 710), female allotype and female paratypes from Vergel, Chiapas, 6-4-35 (M. F. 4430), 6-25-35 (M. F. 4642), 5-13-35 (M. F. 4152), 5-20-30 (M. F. 4223) and Finca Vergel, Chiapas, 6-29-35 (M. F. 4351, Dampf).

This species differs from the others in the *uhleri* group by the much larger size, the crown is scarcely differentiated from the face, the anal segment of the male lacks the subapical swellings on the ventral margins, the basal processes on the forceps are less basal and not acute, and the aedeagus while asymmetrical is of different form.

Cedusa Fowler

The genus *Cedusa* Fowler and members of the "*uhleri* group" are as far known the only *Cenchreini* in the Americas possessing asymmetrical aedeagi; however *Cedusa* is well defined by possessing subantennal processes on the cheeks and lacking antennal foveae on the pronotum.

C. neodigitata n. sp. (Pl. I, Figs. 6, A-C)

Length 4 mm. Dark over all. Face very broad, scarcely narrowed between the eyes.

Forceps of the male deeply notched on inner margins; apex scarcely hooked; latero-dorsal margin with long, curved, acute process arising near the base and extending apically the entire length of the forcep. Aedeagus with small subbasal spur in addition to the apical processes.

Holotype male "Reventazón, Costa Rica," Osborn collection.

Persis Stål

Persis Stål represented by *fuscinervis* Muir has the antennal foveae truly vestigial while *stali* Muir has the ventral margins of the foveae quite raised and the dorsal margins distinct. They both agree in having the face much narrowed and cleft and the head acutely angled in profile. The aedeagus in both is symmetrical. There can be no doubt that these two are congeneric; therefore the presence or absence of antennal foveae on the pronotum is, in this case, scarcely a pertinent generic character. The following species has the antennal foveae more prominent than *stali* but less so than in the *Phaciocephalus*. It is possible that this species may be no more than a variety of *stali* as there is only a damaged female available for comparison.

P. foveatis n. sp. (Pl. I, Figs. 7, A–C)

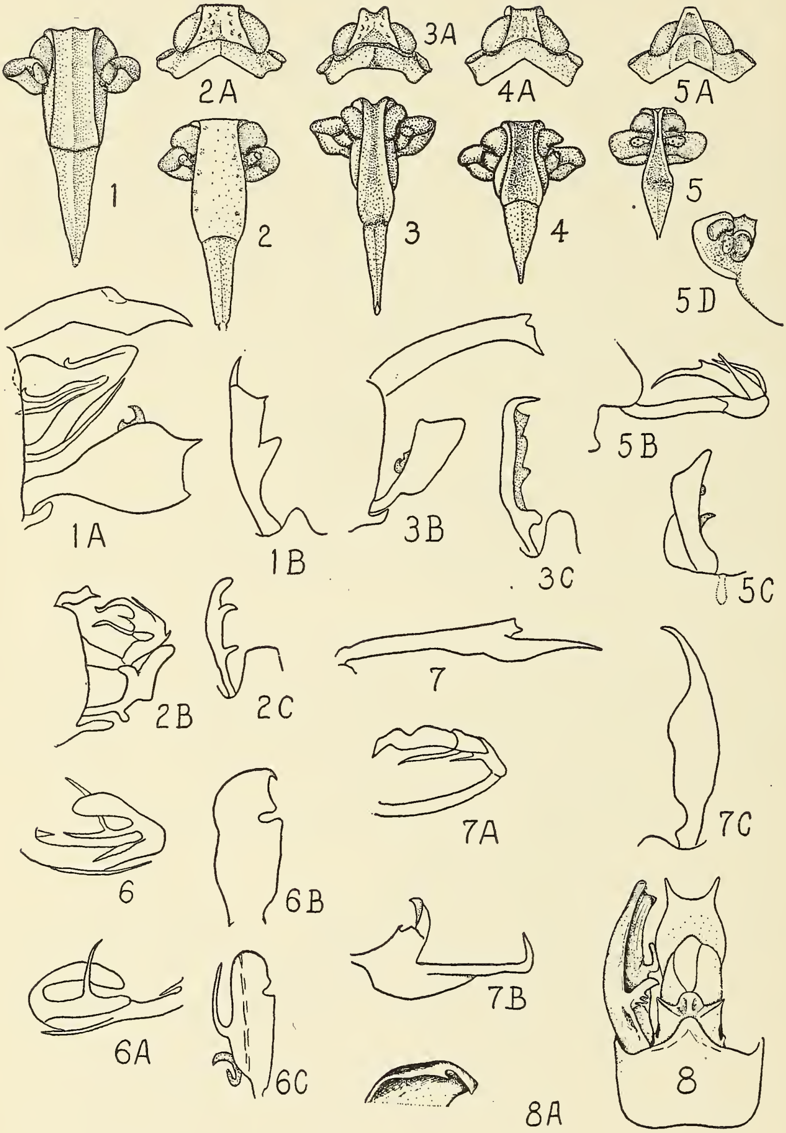
Length 7.5–8.5 mm. General color of body orange. Vertex, center of pronotum, median of mesonotum, and antennal foveae white. Lateral carinae of face narrowly black. Elytra and veins white with median portion of cells fuscous.

Anal segment of male long, slender, deeply bifid apically. Medio-ventral process of pygofers small. Forceps with apical third long, slender; inner margins with small but blunt basal processes; dorsal margins greatly produced dorsad. Aedeagus symmetrical. Caudal flap of female pregenital plate subspherical.

Holotype male, allotype female, and paratypes from Jesus Carranza, Veracruz, 10–14–41 (DeLong, Good, Caldwell & Plummer), male paratype from Huixtla, Chiapas, 9–3–37 (M. F. 2740, Dampf) and female paratypes from Sochilapa, Oaxaca, 10–13–41 (DeLong, Good, Caldwell & Plummer).

PLATE I

Fig. 1. *Herpis fusco-vittata* Stål. Face.
Fig. 1–A. Profile of male genitalia.
Fig. 1–B. Ventral aspect of forcep and medio-ventral process.
Fig. 2. *Phaciocephalus minutianus.* Face.
Fig. 2–A. Dorsal aspect of crown and pronotum.
Fig. 2–B. Profile of male genitalia.
Fig. 3–C. Ventral aspect of forcep and medio-ventral process.
Fig. 3. *Phaciocephalus parishi* Muir. Face.
Fig. 3–A. Same as 2–A.
Fig. 3–B. Same as 2–B.
Fig. 3–C. Same as 2–C.
Fig. 4. *Phaciocephalus uhleri* Ball. Face.
Fig. 4–A. Same as 2–A.
Fig. 5–A. *Contigucephalus rubravenosus.* Face.
Fig. 5–A. Same as 2–A.
Fig. 5–B. Same as 2–B.
Fig. 5–C. Same as 2–C.
Fig. 5–D. Profile of face.
Fig. 6. *Cedusa neodigitata.* Left view of aedeagus.
Fig. 6–A. Right view of aedeagus.
Fig. 6–B. Ventral aspect of left forcep.
Fig. 6–C. Lateral aspect of left forcep.
Fig. 7. *Persis foveatis.* Left side of male anal segment.
Fig. 7–A. Left side of aedeagus.
Fig. 7–B. Left side of left forcep.
Fig. 7–C. Ventral aspect of right forcep.
Fig. 8. *Phaciocephalus brunnea* McAtee. Ventral aspect of holotype male genitalia. (R. I. Sailer).
Fig. 8–A. "Apex of right pygofer." (Probably apex of forceps?) (R. I. Sailer.)


3A
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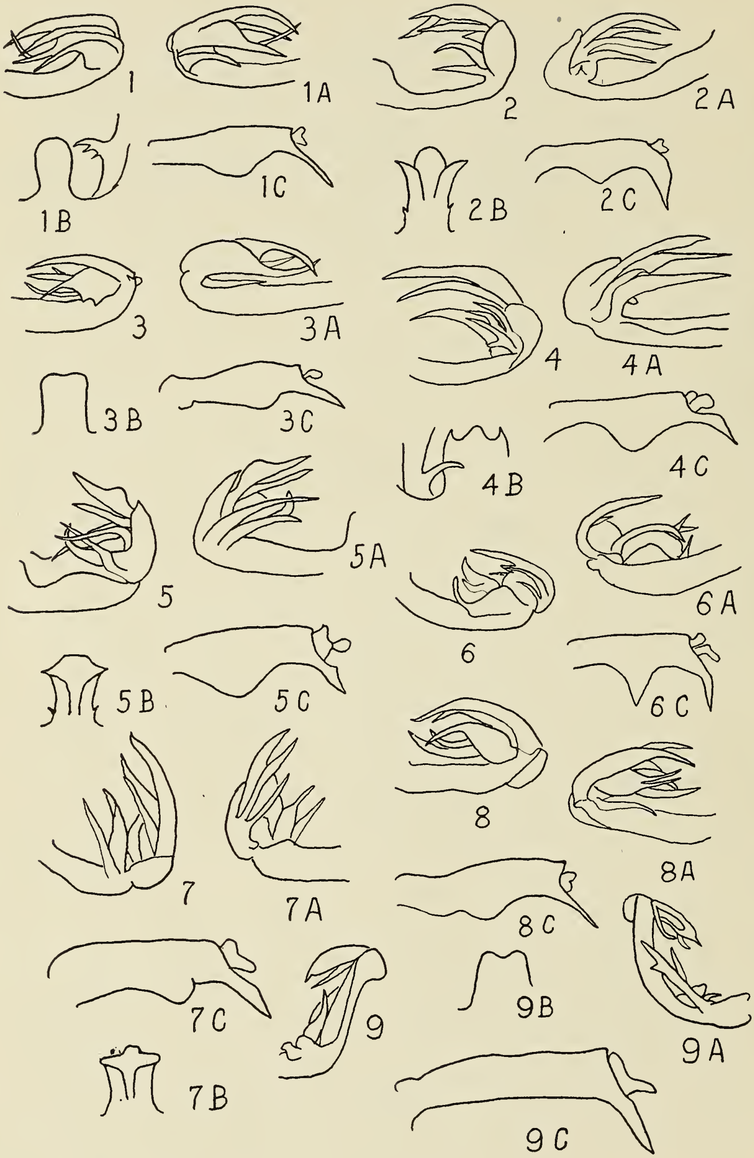
2B
2C
7
7A
7C
6
6B
6A
6C
7B
8
8A

PLATE II

FIG. 1. *Phaciocephalus uhleri* Ball. Left side of aedeagus.
FIG. 1–A. Right side of aedeagus.
Fig. 1–B. Medio-ventral process. (Also basal process of forcep.)
Fig. 1–C. Left side of male anal segment.
Fig. 2. *Phaciocephalus mcateei* Dozier. Same as 1.
Fig. 2–A. Same as 1–A.
Fig. 2–B. Same as 1–B.
Fig. 2–C. Same as 1–C.
Fig. 3. *Phaciocephalus texanus.* Same as 1.
Fig. 3–A. Same as 1–A.
Fig. 3–B. Same as 1–B.
Fig. 3–C. Same as 1–C.
Fig. 4. *Phaciocephalus triatus.* Same as 1.
Fig. 4–A. Same as 1–A.
Fig. 4–B. Same as 1–B.
Fig. 4–C. Same as 1–C.
Fig. 5. *Phaciocephalus nigripennis.* Same as 1.
Fig. 5–A. Same as 1–A.
Fig. 5–B. Same as 1–B.
Fig. 5–C. Same as 1–C.
Fig. 6. *Phaciocephalus quadrispinosus.* Same as 1.
Fig. 6–A. Same as 1–A.
Fig. 6–C. Same as 1–C.
Fig. 7. *Phaciocephalus anastomosus.* Same as 1.
Fig. 7–A. Same as 1–A.
Fig. 7–B. Same as 1–B.
Fig. 7–C. Same as 1–C.
Fig. 8. *Phaciocephalus punctus.* Same as 1.
Fig. 8–A. Same as 1–A.
Fig. 8–C. Same as 1–C.
Fig. 9. *Phaciocephalus dubius.* Same as 1.
Fig. 9–A. Same as 1–A.
Fig. 9–B. Same as 1–B.
Fig. 9–C. Same as 1–C.

PLATE II


1
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9C

A FEEDING HABIT OF POANES HOBOMOK (THE MORMON SKIPPER).

By George W. Rawson, Detroit, Mich.

On June 5, 1944, I captured a male specimen of *P. hobomok* in a spruce bog about 4½ miles west of Luzerne, Oscoda County, Michigan. As I was making preparations to place the insect in a cyanide jar, it settled on my thumb, and raised my curiosity by failing to show any desire to fly away. On closer examination it seemed that the insect was apparently feeding on the skin of my thumb, making use of its proboscis in the customary manner of these insects while feeding. As it is well known that practically all butterflies and moths in the adult stage utilize food only in liquid form, I began to wonder what material the insect could possibly be obtaining from the skin of my thumb. As the insect quietly continued its feeding motion it became possible for me to properly focus a pocket lens on the thumb area and thus see quite clearly what was actually taking place.

The insect was depositing, from the lowered tip of the abdomen, a minute quantity of a clear liquid, too small to be seen by the naked eye, and then almost instantaneously absorbing it through the proboscis. This action continued long enough to permit my field companion, Mr. J. H. Newman of Detroit, to witness the details of the action and to confirm my opinion that the insect was indeed actually feeding.

It would, therefore, appear that Nature has endowed this insect at least, with a means of feeding on dry but soluble material, affording it an opportunity to obtain nourishment which otherwise would not be available. One can only speculate as to what the butterfly was obtaining from the skin of the thumb, ranging through the various chemical salts deposited from evaporated perspiration and possibly also from the skin débris. There also may be a possibility that the liquid secreted (or excreted) by the insect, contained enzymes.

I am recording this incident as a matter of interest to entomologists in general, and as an inquiry to others who may have had an opportunity to observe what, to me, was an entirely new feeding habit on the part of a member of the Lepidoptera.

A KEY TO THE SPECIES OF GEOTRUPES (COLEOPTERA, SCARABAEIDAE) OF AMERICA NORTH OF MEXICO.

By J. Chester Bradley, Cornell University, Ithaca, N. Y.

The following key, which avoids sexual characters, may be useful in the determination of material. None has been published since Blanchard's in 1888. No attempt has been made to study questions of synonymy, the species and names accepted being those adopted in Leng's Catalogue or subsequent literature. I am indebted to Dr. E. C. Van Dyke for calling my attention to the fact that *G. occidentalis* Horn is not an American insect.

1. Elytra with impressed striae .... (4)
   Elytra devoid of impressed striae .... (2)
2. Elytra densely spiculate, without punctures; mat; ♂ with a frontal horn .... (*Mycotrupes*) *lethroides* Westw. 300
   Elytra with rows of punctures; ♂ without a frontal horn ... (3)
3. Polished and shining; middle and hind tibiae with only a median longitudinal row of punctures on anterior surface, the inferior margin not bordered by a ridge.
   (*Peltotrupes*) *chalybeus* Lec. 292
   Mat, with the lustre of gun-metal; anterior surface of middle and hind tibiae with two longitudinal rows of setigerous punctures, the lower edges of which form a ridge, the inferior margin of the tibia bordered by the lower one of these.
   (*Cnemotrupes*) *opacus* Hald. 29
4. Setigerous groove on anterior surface of front tibiae interrupted by a strong curved carina which extends onto the penultimate tooth of the superior margin, and is continuous with the broad smooth inferior margin of the tibia .... (9)
   Groove of front tibiae continuous and unbroken to tip, or very slightly broken, but no carina from penultimate tooth crossing it .... (5)
5. Row of setigerous punctures on anterior surface of front tibiae close throughout to the inferior margin of the groove in which it is situated, the surface of the tibia below this groove broad and smooth .... (5)
   Row of punctures on front tibiae distant apically from the carina forming the lower edge of the broad channel or fossa in which it is situated, this carina forming a narrow inferior margin for the anterior surface of the tibia.
   (*C.*) *blackburnii* (Fabr.)

6. Elytral striae punctate . . . . (7)
Elytral striae impunctate . . . . (*Onychotrupes*) *semiopacus* Jek. 298

7. Mesosternum with median spine or crest in front of coxae . . (8)
Mesosternum with merely a median low, rounded carina; first segment of middle tarsus much shorter than following three united . . . . (*O.*) *splendidus* (Fabr.) 299

8. Mesosternum with an acute, erect spine; posterior edge of pronotum strongly margined throughout; first segment of middle tarsus equal to the following three united. (*Cnemotrupes*) *egeriei* Germ. 294
Mesosternum with a rectangular crest; posterior edge of pronotum not margined laterally; first segment of middle tarsus shorter than the next three united . . . . . (*C.*) *ulkei* Blanch. [illegible]

9. Mesosternum with a median keel, produced forwards as a crest, the anterior angle of which is not sharper than a right angle; punctures in setigerous groove of anterior tibiae transformed into oblique grooves. (*Anoplotrupes*) *hornii* Blanch. [illegible]
Mesosternum without a median keel, anteriorly with a median spine which is much more acute than a right angle; punctures in tibial groove less elongate . . . . (*A.*) *balyi* Jek. [illegible]

COMMENT ON SOLUBEA BERGROTH.

By J. R. de la Torre-Bueno, Tucson, Ariz.

The findings of Dr. R. I. Sailer in his just-published paper, in which a new species of *Solubea* is described for the United States, with distributional notes on others, makes obsolete the key for the genus in my Synopsis (p. 213). He names in this paper a new species from Mexico and the adjacent United States, *Solubea mexicana* Sailer, which is in part the form heretofore recorded as *S. pugnax* Fabricius. To these recorded species are added *S. linki* Heidemann and *S. ornata* Sailer, as possibly to be found in Florida.

Perhaps the most easily seen character to differentiate at sight between *S. pugnax* and *S. mexicana* is the humeral spine, which while acute in both is long in the former and short in the latter, in both slender and acute.

A dichotomy to replace that in the "Synopsis," based on Dr. Sailer's Key and expanded by additional structures from the descriptions follows.

Genus Solubea Bergroth 1891.

Key to Species of North America and the West Indies.

(The species belong in the section with antennal segment II longer than I, and the suture between II and III distinct, making antennae distinctly 5-segmented.)

1. Width of scutellum at base *equal* to its length (pronotal calli raised, causing anterior part to appear transversely impressed; length, 5.5–7 mm.; width 2.8–3.1 mm.). *linki* Heidemann
Cuba and Isle of Pines (8 cotypes).
Width of scutellum at base *less than* its length 2
2. Humeri with spines directed anteriorly, their outer margin continuing the line of the costal margin of the hemelytra in normal position 3
Humeri *without* spines, or if they are present forming a posterior continuation of the lateral margin of the pronotum, projecting at right angles to the line of the costal margin of the hemelytra 4
3. Lateral margin of the pronotum anterior to the humeral spine with a pronounced carina, edge roughened, almost serrate; length, 9–11 mm.; width, 4–4.25 mm. .... *mexicana* Sailer
Mexico—Colima, Morelos, Guerrero, Sonora, Tamauli-

pas, Jalisco; ARIZONA—Huachucas and vicinity of Tucson; Santa Catalina Mountains.

Lateral margin of the pronotum anterior to the humeral spine obtusely angulate, not more than calloused; length, 9–11.5 mm.; width, 3.75–4.75 mm. .... *pugnax* Fabricius
North America east of the Rockies, Minnesota and New York south; West Indies; Northwest Mexico.

4. Male clasper with the apical margin linear seen from above, regularly concave from side; female?; antennal segment II equal to or longer than I; length, 7–9.5 mm.; width, 5–5.5 mm. .... *insularis* Stål
West Indies, Florida, Mexico, Central America.

Male clasper with apical margin linear seen from above, never regularly concave from side; female hind tibiae immaculate, or if spotted not as conspicuously as the anterior tibiae; antennal segment II longer than I; length, 7.8–9.7 mm.; width, 3.7–4.2 mm. .... *ornata* Sailer 1944
Santo Domingo, Puerto Rico.

Dr. Sailer in his paper lays great stress on the terminalia, which are covered at length; other structural characters given are few and very briefly mentioned. Color, however, is treated with great detail.

Some comment on localities cited in this paper might also seem to be in order. For *Solubea mexicana* is given a locality "Vulcano" in Colima. Careful checking with maps of Mexico does not reveal this name, which is probably a misspelling on the label of the Spanish "Volcan," which is the Volcano of Colima nearby the city of that name. Another locality for this species is "Omeltema," Guerrero (H. H. Smith); the geographical and introductory volume of Biologia Centrali Americana shows "Omilteme" in the map, and this name will be found thus spelled throughout the Heteroptera parts of the work. The locality given as "Cajome" is correctly *Cajeme,* a small town in the southern part of the State of Sonora, Mexico. In Arizona, Santa Cruz River and valley is indefinite; *Tucson* is misspelled Tu*sc*on; "Huachuca" should be specified either at Fort Huachuca, or Huachuca Mountains.

The dimensions of *Solubea insularis* are not given; they are (see Synopsis, p. 219); length, 7–9.5 mm.; width (at humeri) 5–5.5 mm.

Sundry typographical errors in localities escaped the editorial eye, also.

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(Also, Mexican Year Book for 1909–1910, an official Mexican publication, with data and maps of all the Mexican States and Territories.)

AN APOLOGY AND AN URGENT PLEA.

To Our Readers.

It cannot escape the notice of our readers that this number of the Bulletin carries far, far too many papers by the editor. This is through compulsion, because of the great absence of shorter papers by other authors. Our issues must appear more or less on time and five times a year, to comply with postal regulations; and we have to use what there is on hand to fill our pages.

As always, our pages are open to anyone who has anything to say bearing on entomology. But so many of our younger entomologists are in the armed forces; and the elders either in some form of war work as a part of their duties, or in other volunteer effort to the same end. The stories are the same in letters we receive or in the news we get—overwhelmed with imperative tasks, from air-raid wardens in the icy New England winters to giving special courses in medical entomology; or even teaching alien subjects in induction courses.

It is heart-breaking to consider that we are waging a vast and abhorrent war to preserve our human and cultural values; and in the very core of Western civilization, we are slowly but surely impairing them.

This is a strong appeal for contributions to maintain these values. It is directed to those among us who can still produce, even though in labor and in pain.

J. R. T.-B.

N.B.—This is still another screed from the editorial flowing fountain pen.

THE LARVA AND CHRYSALIS OF DIONE JUNO ANDICOLA BATES.

By F. Martin Brown, Colorado Springs, Colo.

Two full grown larvae of this Andean race were collected October 9, 1938, on the trail from Baños, in the province of Tungurahua, Ecuador, to Runtún—a high hill just south of the town. They were making silk patches on the heavy leaves of *maguey* which is obviously not their food plant. One specimen was preserved in alcohol, the other allowed to pupate and emerge for determination.

Mature Larva: Length 3 cm., greatest diameter 4.5 mm. The ground color is dark olive brown, almost black. This is almost obliterated by a mosaic of dark burnt orange spots. The anal plate and head are black. Segment T1 bears two short subdorsal spines, T2 two long lateral spines and T3 two long

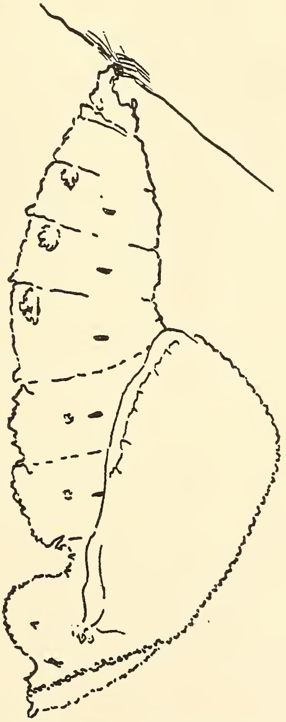

Fig. 1. Pupa of *Dione juno andicola*

subdorsal and two short lateral spines. Each abdominal segment except the last bears six spines. These are arranged in subdorsal, lateral and sublateral rows. The lateral pair is missing on the terminal segment. All of the spines are black.

Pupa: Length 2.23 cm., greatest depth 0.89 cm., greatest width (at wing flanges) 0.67 cm. Highly cryptic, marbled black and cream with the black predominant. It is pendant from a tuft of silk. It is deeply keeled with a deep thoracic arch in the dorsum. All the organs of the head are studded with dull red-brown "warts." The inner margins of the forewings form thick, dirty white flanges on the sides. The outer margins of the wings are decorated with fine black lines forming "Ts" at the ends of the nervules. The first three abdominal segments are decorated with subdorsal, warty ridges and a wart above the black stigma. The ventrum of these segments is covered by the wing-cases. Segments 4–6 bear large, subdorsal, warty prominences at their caudal margins and have centrally at the anterior margin smaller, deep cream colored warts. Segment 7 bears a subdorsal pair of small, red-brown warts. Segment 8 and the cremaster are covered with small red-brown warts. This specimen pupated during the night of Oct. 11 and emerged Oct. 25 at 10:30 A.M. On the sides of segments 4–7 the creamy white dominates in the marbling. The ventrum of segments 4–6 is covered with a creamy pink mold-like area.

ENTOMOLOGICAL TRIVIALITIES AND PERSONALITIES

By Phil Rau, Kirkwood, Mo.

(Continued from June number, p. 91)

A Painting of Auguste Forel.

Students of social insects as well as the admirers of Auguste Forel may be interested to know there exists somewhere in Berlin an excellent painting of the naturalist done in the expressionist manner by Oskar Kokoshkia. This was painted in 1910, and a white and black reproduction is to be found in Sheldon Cheney's work entitled *The Story of Modern Art,* published in 1941.

William Morton Wheeler and Other Eminent Entomologists and the Encyclopedia Britannica.

Biology students the world over know the high value of the work of the late William Morton Wheeler in the taxonomy and the behavior of social insects, but his fame has evidently not yet reached the world at large, for he is not even mentioned in the *Encyclopedia Britannica!*

Dr. C. K. Ogden goes into a tirade over certain sins of omission and commission by the editors of the edition known as the *New Britannica* ("Saturday Review of Literature," Oct. 23, 1926)[2] and he is especially mortified that Dr. Wheeler and his work are entirely forgotten. He says:

> ". . . it is disappointing to find no mention of so profound and influential a thinker as Professor William Morton Wheeler, America's leading entomologist, and perhaps her leading sociologist as well."

Dr. Wheeler is not the only important entomologist to be so badly treated by Britannica, for several others are likewise omitted. Dr. Ogden says further:

> "Fabre is in, but Donisthorpe, Bugnion, Emery, and Escherich, no less than Mr. Ernest Thompson Seton have naturalized in vain, and Father Wasmann is apparently too myrmecophilous to even be entered as a symposiast in the Animal Intelligence controversy. . . . As for the other dominating figures in the record of the last fifteen years, it would be hard to find more startling omissions than Auguste Forel."

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[2] Reprinted in Clifton Fadiman's *Reading I've Liked,* 1941.

DR. WHEELER'S BOOK REVIEWS.

Students of insect behavior are deeply grateful that many of Dr. Wheeler's inaccessible papers have been reprinted under the title *Philosophical Essays in Biology,* 1939, but it seems to me a serious mistake has been made in not reprinting Dr. Wheeler's equally inaccessible book reviews.

Some of his finest thoughts on instinct, intelligence, and the evolution thereof are embodied in such book reviews as that of F. W. L. Sladens' *The Humble Bee* (Science N.S., 37: 180–182, 1913), of Tarlton Rayment's *A Cluster of Bees,* 1935, (Quarterly Review of Biology, 11: 337–341, 1936), E. L. Bouvier's *Psychic Life of Insects* (Science N.S., 52: 443–446, 1920), Auguste Forel's *Social World of Ants* (Journal of Social Psychology, 1: 170–177, 1930), and E. T. Snyder's *Our Enemy, The Termite* (Psyche, 43: 27–29, 1936).

Equally valuable to the student of insect psychology are the introductions Dr. Wheeler wrote for the books of other students of insect behavior. I am thinking particularly of those to O. E. Plath's *The Bumble Bee,* 1934, and P. and N. Rau's *Wasp Studies Afield,* 1918.

Dr. Wheeler's book reviews as well as his "introductions" should be reprinted and made accessible to present-day students. In addition to those mentioned, several more are worthy of re-publication. They may be selected from nearly 500 titles of Dr. Wheeler's papers listed in Psyche, 54: 61–91, 1937.

* * *

A Gloss by the Editor—Mr. Rau's remarks preceding on the absence of the names of great figures in entomology and biology from the *Encyclopedia Britannica* show a normal condition in encyclopedists. Entomology in many of its disciplines furnishes and develops the material facts that go toward making theories workable. It is indeed from the vastness of its field greater in extent than any other branch. Seemingly, however, its rating bears a close relation to the smallness in size of the objects with which it deals; and in biology it becomes one of the minor of its divisions. Even so, entomology in all its phases deals with the same phenomena of life as mammalogy, let us say. From reproduction to senescence and eventual decay, an insect exhibits the same course as a bird, or a cat, or even a man, during its brief life and according to its smaller size. It eats and digests, it grows and develops, it multiplies and diminishes, just like any other animal.

Now, encyclopedias are a delusion and a snare. They are meant for the literate illiterates who want their facts and knowledge handed out in predigested capsules. The writers have their own pet idiosyncracies which inevitably creep into their articles and accordingly bias them. And their editors and writers are extremely subjective as to what to mention and what not to mention. It is a vain labor to look in them for any detailed, precise or unbiased information, although that is their declared aim.

Moved by Mr. Rau's comments and citations, I looked into the *Columbia Encyclopedia* to see what it might have to say about that great man and philosopher, William Morton Wheeler. To him it dedicates as much as 12 lines of print, four on his birth and studies, four on his teaching and his service in the American Museum of Natural History, two on his work, and a final two name three of his books—*Ants, Social Life Among the Insects* and *Demons of the Dust.* But not a word evaluating his rank as a great biologist, philosopher and social student.

Edmund B. Wilson, the cytologist, gets also a bare 12 lines, but it does hold him as noted for his work in the cell, embryology and experimental morphology. Only two of his works are mentioned.

But Thomas Hunt Morgan, being a Drosophilist, gets 19 lines and a panegyric on his work on these flies. Also is mentioned his Nobel prize in 1933. Seven of his books are mentioned with the remark that they are "now classic in the literature of genetics." Which is what he gets for being a Columbia professor for 24 years.

The status of biologists in this encyclopedia may readily be gauged by this comparison. De Wolff Hopper, the actor, gets 14 lines; and that verse form, the "limerick" gets 20 lines. And this encyclopedia gives long-forgotten politicians whole columns, and completely omits Raymond L. Ditmars, who certainly knew something and did something.

And this all goes to show the very fragmentary idea that makers of encyclopedias have on the things and men that really count.

WHY NOT EAT INSECTS?

By J. R. de la Torre-Bueno, Tucson, Ariz.

The subject of the relationships of insects to man—sometimes so *very* intimate—is as vast as the nearly ten million distinct kinds of things that fly and things that creep, each after its own kind, that exist in the world today. In primitive lore and practice (and sometimes in that of very modern people), the place of insects in the scheme of life ranges from magic and medicine to staple food.

Fascinating as the first two subjects are, they are set aside for now; for the far more practical and socially useful one of nourishment. This is current, while the magical and medicinal values of insects are now relegated to the area of superstitions. No longer are ". . . three wall lice (i.e., bedbugs) mixt with wine and garlick bruised together" prescribed for human ills; in modern practice, the shaman, with his mask, his rattles and his medicine bag stuffed with wonder-working oddments including desiccated insects, is supplanted by his present-day successor, the high-priced specialist (magic *always* has been costly), with his injections of dead bacteria or their products, and a glittering array of apparatus and instruments, including electric lights wherewith to inspect one internally.

The ever-present and urgent need of man has always been, and always will be, an adequate supply of food. Everything not fatal is edible and nutritious. The pragmatic primitive mind believes implicitly in the Spanish aphorism, "Lo que no mata, engorda" (That which does not kill, fattens). In practice, everything that swims, flies, walks, creeps or crawls is fit for the pot, or eaten raw; and what so available at special seasons, as the vast swarms of insects that the gods send from the skies from time to time, or those which teem day by day in the forest and in the field?

Even occidental entomologists, given to the more subtle pleasures of life, find grateful in their mouths at least the sonorous or sesquipedalian names of insects.

However, the subject of insects as food is exceedingly extensive; and here I present merely a small part of what is known, because an extensive treatment would be wearisome, and the data are scattered through many anthropological and ethnological works not now available.

This is not an entomological contribution, but rather an essay on cultural anthropology—the mores of peoples—it is discussed by regions of the earth, although, as this goes along, a great similarity of entomophagous habits will be noted among peoples widely separated in time, space and culture.

There is no inherent reason of right or wrong to compel us or to lead us to forego insects as an available article of diet. Without a qualm, we eat oysters, and those near relatives of insects, crabs and lobsters, not to mention sea-spiders, even though all these are scavengers of the seas. Insects, on the other hand, in the main are strictly vegetarian, and, except in the scavenging forms, dainty feeders. What does the cabbage worm eat? Or the celery-tier? Or the apple worm? (Parenthetically, we have each and everyone of us eaten them, been none the wiser, and suffered no digestive disturbance—except when our over-heated imaginations got the better of our stomachs). So, with minds cleared of notional cobwebs, let us see what has been, and is being eaten in remote corners of the world, of the myriads of insects all about us.

In fact, I shall describe a personally conducted world-tour of food, in fad, fancy, and fact; and we shall rummage the flesh-pots of the world for what we shall find therein. This search has the world for its province; in time, it spreads over the ages. A certain school of biological thought attributes the rise of insect eating to the days when the ape's hair became curlier. Those who have been observers in the Primate House in any well-conducted zoological park do not need any details; those that have not seen, have a treat in store. The fact remains that the more primitive a people, the greater a part insects play in their food habits.

In Australia, we have one of the noted examples of insects as an important food element. The Blackfellows, who are among the most primitive of the races of mankind, like all nomadic primitives, were either starving or feasting. Their nitrogenous diet was derived from animals, which include insects, the latter mainly in the early stages of their development into the adult—such immature insects as caterpillars and beetle-grubs, or else full grown winged moths of large size. The chief of these last was the noted Bugong Moth, which appeared periodically in the Bugong Mountains of Central Australia. This inconspicuous grayish moth comes from one of the cutworm caterpillars (*Agrotis infusa* Bd.), of evil fame to all who raise garden vegetables. To the Blackfellow, the moth was a gift of the Higher Powers. The tribes came in numbers to garner the uncountable moths, fat, full-fed, replete with eggs. The moths were gathered in sacks, heated over a fire, and the legs, wings and scales were then winnowed out. The bodies were pounded into a dough or paste, and eaten in this form; or else were dried and preserved.

Perhaps the most primitive inhabitants of Africa are the pygmies of the Equatorial forest. These eat everything. Insect grubs of many kinds, especially those living under the bark of dead trees—mostly beetles—are sought out and eaten raw. There are no specific data as to just what they eat—only references by travellers and explorers, who naturally would not be expected to know what insects they represent—even entomologists would not know, except in the most general way.

The African Bushmen, possibly one degree higher in the cultural scale, eat grasshoppers in a big way. To them a cloud of locusts is an added blessing—if the grasshoppers eat their scanty crops, it is but to become a storage for proteins for future use by the Bushmen.

However, from time immemorial, the Arab and the Jew have eaten grasshoppers, better known as the Egyptian locusts *Schistocerca* (or *Locusta*) *migratoria,* the locust that to this day desolates the Mediterranean littoral, especially in Africa. In fact, the Mosaic Law specifies them thus: "These ye may eat: of every flying thing that goeth upon all four, which have legs above their feet, to leap withal upon the earth (vs. 2); even these ye may eat; the locust after his kind and the bald locust after his kind, and the grasshopper after his kind (vs. 22). But all other flying creeping things which have four feet shall be an abomination unto you (vs. 23)." Thus far the XIth chapter of Leviticus, which lists, as everybody knows, the clean beasts that may be eaten, and the unclean, which are an abomination, for, saith the Lord, "neither shall ye defile yourselves with any manner of creeping thing that creepeth upon the earth."

The Arabs, in Africa and Arabia, who in some measure follow the Mosaic Law, also eat locusts.

The manner of preparing them is the same with all—the locusts are trapped in trenches or by means of great fires burning in the path of their migratory flights. They are then more or less toasted and separated from their horny heads and spiny legs, and prepared for eating in various ways—sometimes boiled, sometimes toasted, sometimes ground up dry into a kind of flour or meal, and made into cakes.

The Malagasies borrow from Asia, and eat silkworms.

For some reason, when we come to Asia there are more definite data with regard to insects as food. Either the southeastern Asiatics eat insects to a larger degree, or more competent entomologists have investigated the subject in that part of the world. Of course, eating silk-worm pupae by the Chinese has been told time and again.

Let us give these careful attention as an edible. Consider first the imperative necessity of rearing silk-worms in conditions of absolute cleanliness to prevent disease and consequent great loss; and with the full-grown caterpillar at pupation the wastes of uneaten and digested food must be completely removed, else they might get into the silk of the cocoon, foul it, and impair its quality. Then look on the food of the caterpillar—nothing but fresh, green, succulent leaves of the white mulberry day by day, the old ones being removed or the caterpillars changed to fresh feeding-trays. Then, silk-worms are well-fed, for a well-fed larva is a strong larva and builds a good silk cocoon. Thus, we have a well-fed, cleanly-fed, healthy animal of clean habits. But we civilized Europeans will have none of it, for no discernible reason.

The other parts of Asia have had the attention of many British entomologists, in or out of the government service. In one paper, by Ghosh, he names about 10 or 12 insects used as food in Burma. His remarks about silkworms follow:

"Silkworms are eaten fried and may be stored for future use, being boiled when required to be eaten. They are known as Po-gaung-gyaw, and sell for 1½ rupees per viss (3½ lbs.). Not a single silkworm pupa is wasted, it being ready to be eaten as soon as it comes out of the reeling pan in boiled condition. It was a delightful sight to see little children come begging for such pupae from the Indian reelers who were engaged in the Prome district among the Yabeins. The boiled pupae relieved the monotony of the girls being trained, who had a ready dish to be taken home after the day's task was done. In the Karen Hills a dish of pupae was offered to and readily partaken of by the Town Officer (a Karen gentleman) who visited a silkworm rearer's house where reeling was being done. Presents of such pupae were said to be made very frequently."

Among other insects eaten were the ant, *Oecophylla smaragdina.* The adult ants, grubs and pupae are suffocated in an air-tight vessel with smoke; picked clean; made into a paste which turns sour, termed Khagyin. A large brown cricket, *Brachytes portentosus,* called *payit* is sold fried in the Mandalay market, and is then called *Payit-kyaw* (fried cricket); is is used in large quantities by the wealthy to feed the *hpoongyis,* the wandering buddhist monks. The grubs of *Oryctes rhinoceros,* one of the big horned beetles, are deemed a great delicacy. The grubs are picked out of manure piles in which they breed, cleaned and eaten fried; the grubs of another beetle are included with them. The grubs of one of the snout beetles, *Rhynchophorus ferrugineus,* are called *on-po,* and are esteemed a great delicacy. They are boiled and skinned, and taste like boiled coconut milk. These grubs are also fattened inside ripe coconuts from which the milk has been removed; such a fattened grub may cost as much as 8 annas. The pupae of *Heliocopris bucephalus,* called *shwe-po,* are about 2 inches long, and these are eagerly sought for and eaten as an expensive article of food; no recipe for cooking them is given. Other insects eaten are the larvae of long-horned beetles, which are preserved in oil and eaten with *laphet* or Burmese tea; winged Termites or white ants are eaten boiled or fried, and taste like almonds. Grubs, pupae and eggs of honey-bees are boiled together with parts of the comb and made into a kind of soup relished by many. Wasp grubs and pupae are also eaten.

Another more recent formal article, on "Insects as Food in Siam," was published in the Transactions of the Royal Entomological Society of London, in 1932, by S. W. Bristowe. This lists 8 arachnids (spiders and scorpions) and 35 distinct species of insects. Scorpions are eaten raw or roasted; two large spiders, one a hairy bird-spider, somewhat like our southwestern tarantula and about the same size, and another, which weighs nearly 1½ ounces are also eaten; the latter is flavored, so the author says, like chicken marrow! Strange, because bird's bones are hollow and without marrow! The spiders are roasted on a stick, which removes the hair, and then eaten with salt or sliced up with chile peppers. These big spiders sell in the market at 1½¢ apiece. The number of beetles eaten is large, both as adults and in the immature stages. Large wood-boring larvae of long-horned beetles and of the metallic-hued buprestid beetles are eaten roasted. The rhinoceros beetles already mentioned are eaten when fully developed either roasted or fried, or used in curries after breaking off the wing-covers and other hard parts; the grubs and pupae are soaked in coconut milk and then roasted; they have a hard-to-define flavor, rather vegetable than animal. As in Burma, in Siam they also eat roasted the larvae of the large palm-weevil, dug out from the tree-trunk, and sundry other unspecified beetle grubs, as well.

The sucking bugs known as Hemiptera are an abundant source of food. The chief of these is the giant water-bug, *Lethocerus* (probably *indicus*), the species of this group found in our own country are termed electric-light bugs, because they used to fly in great numbers about the old-fashioned arc-lights in past years. The bugs of this group grow to great size for insects, in the American tropics—up to nearly 5 inches long. They are perhaps the largest of all insects in dimensions if not in bulk. These big insects live in the depths of the water in ponds and quiet waters, and prey on fish, tadpoles, frogs, and on other insects. The poison produced in their head-glands is so powerful that by its means one of these big bugs is able to overcome fish as much as four times its own length. In Siam, the widespread Asiatic species, *Lethocerus indicus,* is highly esteemed and in Bangkok comes even on the tables of princes. It is taken from the water by nets, like any fish. Bristowe, verbatim, says: "The usual methods of preparing it for the table are as follows: 1. Steam thoroughly and then soak in shrimp sauce. The insect is then served and picked to pieces, each piece yielding a little meat from the inner side. The flavor is strong and reminiscent of Gorgonzola cheese. 2. After cooking, pound it up and use it as a flavoring for sauces or curries. A popular sauce called *Namphala* is made by mixing shrimps, lime juice, garlic and pepper, and then adding *Mang daar* to finish with. Vegetables are dipped in this sauce. The price in Bangkok varies according to season, from 5 to 20 satangs each (1d. to 4d.) and in the cold season, December to February, it is unobtainable. I am informed that in Indo-China its essence is extracted and that it is on sale in small bottles in the towns."

Two other smaller bugs of this group are also caught, by *knocking them down from bushes* during the day—which perching on land, incidentally, is a curious habit in insects whose relatives all live under water at all times, except in their big migration flights. These smaller bugs are roasted and eaten with the fingers like shrimp, in which way the big water-scorpion *Laccotrephes* is also eaten.

Like the ancient Greeks, the southern Siamese eat adult cicadas. The oddity lies in the way they are caught. When the darkness of night comes, a fire is lighted, and the cicada hunters sit around it on the ground. Then they clap their hands in unison, and before long the female cicadas come in swarms. In some places, two pieces of bamboo are used for clappers. This is done night after night at the proper season.

Eight kinds of grasshoppers, including the standard migratory locust eaten everywhere, are used as food in Siam. The usual way to prepare the grasshoppers is by roasting them on sticks over a fire, or by frying them in oil with salt. One of the big praying mantises is also eaten, as well as two kinds of cockroaches, one being the too-well-known ship roach and the other a native species. Roach eggs are eaten fried.

Dragonflies are also eaten, but not in great numbers. Termites or white ants are eaten roasted with salt; they have a vegetable flavor. The queen termite is esteemed as a great delicacy. Caterpillars of various kinds are also eaten, but not the moths or butterflies that come from them. The lean yellow ant, *Oecophylla smaragdina,* is caught in quantity for food, especially the eggs. In Laos, the eggs, pupae and adults of another ant are pickled in brine, tamarind juice and the leaf of Bai-Makfut (*Citrus histrix,* an orange). Bees of eight kinds, both larvae and adults, as well as two kinds of wasps also are eaten.

In the East Indian Islands, insects are also an article of diet. Perhaps the best account of insect-eating there is the following, from Covarrubia's *Island of Bali:*

". . . the people are also fond of strange foods, such as dragonflies, crickets, flying ants and the larvae of bees. Dragon-flies were caught in the most amusing manner; boys and girls wandered among the rice fields waving long poles, the ends of which were smeared with a sticky sap. The supposedly "rank-conscious" (this must be an editorial correction for the popular democratic phrase "class-conscious") dragon-flies must always stand in the highest branches and all the boy has to do is to hold the stick above the place where the fly stood; it flew onto the sticky end of the pole and was caught in the trap. Great numbers were obtained in this curious manner, their wings taken off and the bodies fried crisp in coconut oil with spices and vegetables."

To these may be added the grasshoppers eaten by the Luzon (Philippine) natives. The Ifugao men catch them in big nets and the women (as usual) do the dirty work of cleaning them and cooking them in the common way, by skewering them and roasting or grilling them over a fire. Of course, the catching is done, as elsewhere world-wide, during the periods of swarming, when the locusts fly in clouds that darken the sky.

In the islands of America and other places about the Caribbean Sea, the big grubs of a large palm-weevil are eaten. In Trinidad and in Demarara these are considered choice tit-bits, as well as the larvae of a large beetle, which live in sugar-cane stalks. Both appear to be indiscriminately called "gru-gru" in the French parts. They are eaten either fried or roasted over coals. In Jamaica, the big 3½-inch-long grub of a long-horn beetle is eaten. These are opened, cleaned and carefully washed, and broiled over a charcoal fire. Jamaicans are also said to eat crickets.

Coming to the American mainland, the tierra firme of the Spanish, we begin at our own West. Here there are recorded and even current insect-eating habits in some of the Indian tribes. Of course, wherever one goes, the abundant grasshopper *always* lands in the pot, in some form or another. And from land to land, they are prepared in much the same way—they are parched for preservation, ground into a meal and made into cakes; or they are broiled over coals, or simply boiled.

In Mexico today we may buy in the markets a delicacy called "gusanos," which is Spanish (Castilian and correct) for *worms,* a name applied indiscriminately to what in our English vernacular we name "crawlers"—that is to say, to caterpillars, earthworms, beetle grubs, and so on. These gusanos are found in the heart of the agave plant; they are eaten crisply fried. In some parts of the United States close to Mexico, they are served at cocktail parties as thirst-producers. Another insect product, also an ordinary article of trade in the Mexican marketplace is "ahuautle" or "ahuaucli." This is the eggs of certain water insects of the family Corixidae. They are regularly harvested in the shallow lakes about Mexico City, such as Texcoco. Bundles of reeds (tules, or cattails) are put in the shallow water near the edges, and the insects lay on them their minute eggs in vast numbers. These eggs are so small that, at a rough estimate, there are about 200 million to the pound. The parents that produce these microscopic eggs are exported to Europe by the ton, for bird food. As calculated by a British entomologist, there are about 250 million insects in each ton. What fecundity! In Mexico, the eggs, with some admixture of the adult insects, are eaten made into cakes, or seasoned with chili peppers. They are said to have a faint flavor of dried fish, or of caviar, complicated with a buggy tang.

Coming to our own West, in California there are Indians that crop and eat insects. The Digger Indians of California eat grasshoppers, roasted. The Dogrib Indians of Canada, less tidy in their tastes, eat ox-warbles, raw! The Pah Ute Indians of Utah eat dried caterpillars, and year by year they flock from far and near to harvest the salt-fly of the salt lakes. The pupae of these flies are washed up in vast numbers, and are gathered from the shores by the bushel in hundreds of containers. After the dirt is removed, the hard outer shell of the pupae is rubbed off, and they furnish a food which is claimed not to be unpleasant to the taste. The food prepared from these is called Koo-chah-bie, or Kootsabie. In the vicinity of Mono Lake, in California, the Indians collect for food the caterpillars of a large moth, *Coloradia pandora,* which feeds on two or three species of pines in that region. To get them, the Pah Ute Indians set fire to the rubbish under the trees, and the caterpillars drop down to escape the smoke. They are gathered and dried, and used to make a sort of stew called Pe-aggie. The Klamath and Modoc Indians dig up the pupae from the loose earth at the foot of the trees. The late Professor Aldrich, one of the great students of flies in the United States, says they taste like linseed oil, but I imagine more like turpentine, from the pine needles they have eaten.

The Pomo Indians, in addition to the staple grasshoppers, angleworms and wasp grubs, eat a sort of army worm. These last are trapped in sand pits dug about the ash trees on which they feed. The Indians make no noise while gathering the worms, because it frightens them. The Pomos moreover believe that if anyone speaks crossly to another while gathering the worms, he will be bitten by a rattlesnake. These caterpillars are drowned in cold water; placed in tightly woven baskets with live coals and ashes to roast; then cleaned in open work baskets and eaten. Whatever cooked worms are left over are dried and stored for winter use.

Coming back to Europe and going far into past history, the Greeks of old ate and relished a thing called "cossus," which appears to be the grub of a big beetle, *Lucanus cervus.* They also ate cicadas, their epicurean palates esteeming them a delicate morsel indeed.

Coming down to the present, English cheese-lovers adore skippery cheese! In fact, in an old English cookbook, I have found these directions for getting the delectable result. Take a cheese—a fine, old, ripe Stilton—and at the top make a round hole, keeping intact the piece of rind taken off. Then pour in the hole a glass of fine crusty Port, and cover with the little lid of rind. The family butler conducting this rite is entitled to the excavated fragments from the heart of the cheese. Set the cheese in the buttery for a week or ten days, or even two weeks, and bring to the table with the proper ceremony, together with the traditional silver cheese-scoop. The connoiseurs then enjoy the wriggling richness, and let not one writhe off the plate.

Skippery cheese, biscuits and sherry—what a meal!

And in case supercivilized Americans feel wishful to turn up their noses at such strange delicacies, consider this. It is all legs; the body is only a knot to keep the legs from coming apart. All the vital organs and the muscles are in the legs. This is a Pycnogonid, or sea-spider (a real spider of vast size) which the Japanese abstract from its hidden haunts at the bottom of the Japan sea, 1,000 feet down. The muscles in the legs are shredded and canned; and we enjoy them as an appetizer before dinner, in the form of a crab-meat cocktail!

It's all a matter of taste, or of necessity. The Spanish say "Al buen hambre no hay pan duro" (To a good hunger, no bread is hard).

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(Note—The Jesuit Thomas Gage, in *1625,* also had an account of this.)

THE EGG, LARVA AND CHRYSALIS OF DIONE MONETA HUEBNER.

By F. Martin Brown, Colorado Springs, Colo.

In Baños, Tungurahua Province, Ecuador, this species seems to be the most common representative of the genus during October. For some time I had thought the species to be *vanillae.* The imagoes vary considerably, some of them being very dark on the underside, others much like typical *vanillae.* The larvae, however, are different from those described by Seitz (Macrolepidoptera, Vol. 5, p. 401) for the latter species. His brief description is: "Larva pale brown, ringed with darker, with orange-yellow lateral stripes suffused with grey above, and yellow-ochreous spines; underside dark brown. Head with two rather long spines." The mature larva of *moneta* differs in several respects, principally in bearing black spines, and have a broad yellowish dorsal stripe in addition to creamy white lateral stripes.

Oviposition: The only females observed ovipositing were very much battered. Oviposition took place only in bright sunshine. The eggs were laid singly on various parts of the vine, on the leaves, stems, tendrils and buds. One female was observed on the first sunny afternoon after almost a week of rain and dull weather. During a half-hour period she laid twenty-three eggs on the upper side of a leaf near its tip. This is the only time such "mass oviposition" was observed. Unfortunately for me a pet parrot discovered the eggs before I collected them. Food plant *Passiflora* spp.

Egg: This is subconical, lemon yellow and measures 0.9 mm. in height and 0.4 mm. in diameter. The sides are sculptured with 14 ridges. Between these ridges the surfaces are pitted with elliptic depressions.

First Instar: The larva upon emergence from the egg is 2.2 mm. long with a head capsule 0.3 mm. across. It grows to between 4 and 5 mm. long before moulting. The head is black with long scattered black spines. The body is a dirty olive grey with a little whitish mottling. The first thoracic segment bears sixteen black spines of which ten terminate in little knobs. T2 and T3 each bears fourteen spines of which eight are knobbed. Each of the abdominal segments bears ten knobbed spines. The anal plate bears four such black spines. The six dorsal spines of T1 are set in a blackish patch.

Second Instar: The larva of this stage is about 7 mm. long and the head capsule is 0.6 mm. wide. In general the appearance is as in the preceding stage with the whitish mottling increased and all the spines set in small roundish brown papules except the dorsal spines of T1 which are in a black patch.

Third Instar: The larva in this stage is about 15 mm. long and the head capsule 1.1 mm. wide. The ground color is purple-brown. There are broad dorsal and lateral stripes of yellow which are finely set with black hairs. Each segment bears three pairs of black compound spines. The head, legs and anal appendages are black. The head bears in addition to short black spines two rather large black compound spines. As the time for the moult to the fourth instar approaches the yellow dorsal stripe breaks up into a "T" with five dots, three over the cross bar and one each side of the stem.

Fourth Instar: During this stage the larva is about 25 mm. long and the head capsule 2.0 mm. wide. The markings of the caterpillar are about the same as in the third instar with the most marked difference occurring in the dorsal stripe. This is divided into three parallel stripes broken at the septa.

Fifth Instar: The largest specimen in this instar measured 51 mm. The average length is about 45 mm. The width of the head capsule is 3.5 mm. The ground color is nearly puce. The dorsal stripe is dull orange-yellow to canary-yellow and as in the fourth instar. The lateral stripes are creamy white to pale canary-yellow. These are occasionally tinged with purple during the later part of the period. The dorsal stripes are sometimes edged with grey-white. The compound spines of the head are prominent.

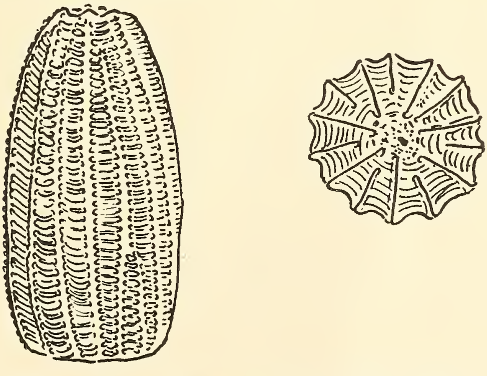

FIG. 1—Egg of *Dione moneta* from side—From above.

Chrysalis: During this stage the insect hangs from a tuft of silk. The shape of the chrysalis is like that of *vanillae*. The keel and laterally compressed thoracic process are much more prominent than on *D. juno*. The color is dull rust brown with a few streaks of darker brown on the wing cases. The entire surface is finely rugous. The abdominal processes are not so bold as those on *juno* nor are they so warty. Length 23 mm., greatest depth 9.6 mm., greatest width 6.4 mm.

PERSONALITIES.

By far the best way to consolidate any organization is through attractive, well-attended meetings, which put the members in touch with each other. The next best way is to keep them informed as to the activities of all, absent or present. This is done in part through our Proceedings, but we really need something more personal. Our Society is widely scattered as regards its members and its widespread list of contributors and subscribers to its journals.

With this number we begin to give some news of activities, especially about those absent or gone. Under conditions as they exist, with unavoidable absences from meetings such a plan would seem to meet a demand. We ask our readers to favor us with items of interest that come to their notice, particularly about those absent in the Services.

* * * * *

Our first news is about our late dear friend, Mr. George P. Engelhardt. His great monograph on the Aegeriidae, with numerous colored plates of the species and structural details, is in active preparation for publication by the United States National Museum. There will be 3,200 copies printed, Mrs. George P. Engelhardt defraying the heavy cost of the plates. Those of us who knew George Engelhardt are completely aware of the great importance of his life-time work in this revision of a little understood but most fascinating group of moths.

* * * * *

We record with great regret the death, on March 7 last, of Mr. August Busck, who had labored so assiduously with Mr. Engelhardt in the innumerable details of the latter's work.

J. R. T.-B.

NEW RECORDS OF ONCOPELTUS (HEMIPTERA, LYGAEIDAE) AND A NEW SPECIES FROM THE U. S.

By J. R. de la Torre-Bueno, Tucson, Ariz.

The following appear to be new records of distribution of this genus of Lygaeidae:

Oncopeltus (*Oncopeltus*) *gutta* Herrich-Schaeffer.
Olas de Moka, Guatemala; 3,000 feet (G. P. Engelhardt).

Oncopeltus (*O.*) *varicolor* Fabricius.
Tumatumari, Rio Negro, British Guiana; Satipo, Perú (Pedro Paprzycki); Las Vegas and Coachi, Colombia.

Oncopeltus (*Erysthrischius*) *cingulifer* Stål.
Dominica, B. W. I. (J. M. Geddes); Canal Zone; Caldas and Cali, Colombia; Mérida, Venezuela.

Oncopeltus (*E.*) *semilimbatus* Stål.
Habana, Cuba (F. Z. Cervera).

Oncopeltus (*E.*) *unifasciatus* Hahn.
Lima, Perú (H. S. Parish). In connection with this species it should be pointed out that there are very few records of Heteroptera from the Pacific coast of Peru; most records from Peru come from the Amazonian region, on the East side of the Andes. Naturally, these species are in the main the same as those from the same region in Brazil, Colombia and Venezuela.

Oncopeltus (Erythrischius) cayensis n. sp.
The species recorded by me[1] as *O. sexmaculatus* Stål as determined by Blatchley's key to the genus, is in error. It runs to *cingulifer* Stål in his key and in my own new one for my Synopsis; but comparison with authentic specimens of the latter species shows it not to be the same. It has a very distinct facies, with the color-picture showing more black.

> Posterior one-third, more or less, of the pronotum is black, with a vitta running to the anterior margin, which it does not always reach, or where it widens; the head is wholly black; the

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[1] 1933. Bul. Bklyn. Ent. Soc., XXVIII: 28–31; On Floridian Heteroptera, with New State Records from the Keys.

hemelytra are black-margined, evanescently, narrowly or broadly, although even in the same specimen there may be a difference in width between the two sides; scutellum black; membrane black; the transverse band of the hemelytra wide, leaving two somewhat small testaceous spots apically and basically on each side. The whole effect is of a velvety-black insect, with six light spots in three pairs, one pair on the pronotum and two on the hemelytra. Venter with testaceous margins and a median black vitta of varying width. Antennal segment I shortest, II and IV subequal, III longer than I and shorter than II or IV. Length, 11–13 mm., width, 3–3.5 mm.

Described from 7 specimens, 4 females and 3 males, taken by Carl George Siepmann on Matecumbe Key, Fla., November, 1931.

These 7 specimens are cotypes, in my collection.

This description follows precedent in being by color, except for the antennal proportions and the size. This goes directly against my proclaimed principles; but the whole differentiation in this group is on a color basis, including all keys. A complete revision of the genus is very necessary in order to delimit the species on a basis of pure structure. This will be possible only with *all* described species and their types in hand, which will have to wait on the return of normal relations among nations.

EDITORIAL.

Why Amateurs?

From time to time, the Bulletin has referred to the status and the real place in entomology of the amateur. By definition, an amateur is one who follows any given avocation for love and without any gainful or professional aim or necessity.

In all the natural sciences the founders and the discoverers in the early days have been self-taught amateurs. These men laid the broad and deep foundations of the sciences, which their successors have refined and elaborated professionally in imposing and wonderfully equipped laboratories.

But the human mind and the human senses are still the bases of all science. Not one of the tools of science but what is an extension of human faculties and senses. For instance, the microscope is nothing more than refinement of the organs of sight. Without eyes, no matter how elaborate it were, the microscope would be but another useless gadget. This is likewise true of the telescope. What are instruments of manipulation—knives, forceps, holders—but refinements and extensions of the fingers and the hand?

The publications of the Brooklyn Entomological Society were established by amateurs for amateurs in an amateur society. The editors have been amateurs. And we still encourage amateurs. And be it said, a professional is successful to the degree to which he retains an amateur's enthusiasm in his approach. When the professional becomes glaciated in technicalities, his product becomes more and more subtle and incomprehensible to the ordinary human mind.

This is not to be taken to mean that there is no value in detailed and minute accretions to knowledge, which have a very proper and necessary place. But it does mean that ultra-refinements in entomology are not the be-all and end-all of this form of inquiry into nature and its processes.

We have said often before this that the proper study of life is in living things—not in desiccated museum specimens. This is the preferred field for the amateur, who can contribute, and still is contributing, his grains of sand to the cement of the vast edifice of science.

J. R. T.-B.

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NOTES AND RECORDS OF THE EASTERN REPRESENTATIVES OF THE PHOTOPSIDINE GENERA OF MUTILLIDAE WITH DESCRIPTIONS OF NEW FORMS

By R. M. Schuster, Cornell University, Ithaca, New York.

This short survey has been prepared in order to bring our very fragmentary knowledge of the Photopsidine wasps of the east up-to-date; to introduce keys utilizing characters not heretofore used; and to describe several new forms.

There have been but two papers of any importance on the eastern species of this group, that by Viereck (Ent. News, vol. 14, pp. 249–251, 1903) who described *Photomorphus* to include two new species of eastern Mutillidae, and that by Bradley (Trans. Amer. Ent. Soc., vol. 42, pp. 309–336, 1916), who described two more new species of *Photomorphus,* and two new species of *Photopsis* subgenus *Odontophotopsis,* which genus he was the first to report from the eastern states. Mickel (Ann. Amer. Ent. Soc., 27: 610, 1934) described the male of *Photomorphus myrmicoides.*

The female of *Photopsis* has previously been unknown from east of the Mississippi; a female, probably belonging to the subgenus *Odontophotopsis* is described in the following pages.

It was found that under *Sphaerophthalma pennsylvanica* three distinct segregates of females were confused. Two of these are described as new below.

The Photopsidine wasps have been found to be as rare in the eastern states as they are abundant in the semi-arid and arid west, which is the center of distribution of the group. This rarity is at least in large part a result of the different conditions as regards humidity, rain-fall, and density of the subsequent ground cover found in the east, as contrasted to the west. The arid areas of Florida offer similar conditions, and it is surprising that no records

FEB 22 '45

for the group are to be found from there; a new subspecies of *Photopsis spinci* is described below from there. All in all, less than two score specimens of *Photopsidine* wasps have ever been collected in the east, excepting the moderately frequent *Sphaerophthalma pennsylvanica.*

KEY TO GENERA AND SUBGENERA.[1]

1. Male with small ocelli, the posterior more than three times their greatest diameter from the eyes and more than their diameter from the anterior ocellus; mesosternum lacking processes or ridges; the pubescence chiefly dusky or black, with plumose hairs. Female with plumose pubescence, at least with a tuft of such pubescence at the apex of the first tergite; pygidium not defined laterally by carinae, not striate. *Sphaerophthalma*

   Male with the ocelli various, but with the mesosternum always tuberculate or with ridges; pubescence usually at least partly silvery; plumose hairs absent. Female with pygidium defined laterally by carinae; the first tergite lacking plumose pubescence 2

2. Ocelli of male small, rarely moderate, the posterior removed from the eyes by at least four times their diameter (rarely larger). Female lacking plumose pubescence, the apical tergites of the abdomen largely dusky pubescent; pygidium striate .... *Photomorphus*

   Ocelli of male large, the posterior removed from the eyes by less than two and a half times their length. Females with plumose hairs at apex of second and some of the apical tergites; pygidium not striate smooth, the apical tergites not dusky pubescent .... *Photopsis* subgenus *Odontophotopsis*

Sphaerophthalma Blake.

This genus includes diurnal forms that still retain some plumose pubescence in both sexes; they have small ocelli and lack propodeal processes or carinae. A single, infrequently encountered species, found from Pennsylvania to Florida, west at least to Louisiana and Missouri (reported from Texas), is our single eastern representative. What represents a second species of female has been found among Texan material, and is described below, in order that it may be differentiated from the eastern form.

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[1] Applicable only to forms east of the Mississippi.

The relationship of the present genus is discussed under *Photopsis.*

Since several Texan forms have been erroneously placed under the eastern *pennsylvanica,* they are described as new below, so as to prevent confusion in the future.

KEY TO SPECIES OF SPHAEROPHTHALMA.

Males.

1. Apical bands of abdominal tergites one to apex entirely black 2
   Apical bands of at least tergites one and two golden or brown 3
2. Apical abdominal segments, legs and antennae black, integument red otherwise . . *S. pennsylvanica* ssp. *pennsylvanica* (Lep.)
   Entirely black, except for the yellowish second segment, and the petiole and dorsum of head, which may be reddish. *S. pennsylvanica* ssp. *scaeva* (Blake)
3. Apical bands of first and second tergites brown pubescent, similar to the pubescence of the disk of the second tergite, the apical tergites black pubescent .... **S. boweri** sp. n.
   Apical bands of all the abdominal segments golden pubescent. *S. auripilis* Blake

Females.

1. Apex of first tergite with a complete band of silvery plumose, dense pubescence; legs blackish, entirely silvery pubescent; eye longer than distance between it and the process of the posterior mandibular articulation ..... **albiplumosa** sp. n.
   Apex of first tergite with but the median fifth with silvery, dense plumose pubescence, the lateral two-fifths with simple black hairs; eye from appreciably shorter to subequal in length to the distance between it and the process of the posterior mandibular articulation 2
2. Legs prominently silvery pilose; hairs of the scape silvery; those of the supraclypeal flange silvery or slightly aureus-tinged; those of the head largely silvery, at most golden in color; thorax similarly pubescent; color of integument light to testaceous ferruginous .... *pennsylvanica*
   Hairs of scape fuscous, those of the supraclypeal flange, the dorsum of the head, the thoracic notum similarly tinged; the legs with the pubescence somewhat tinged, in part at least, not prominently silvery pilose. *pennsylvanica* ssp. **floridensis** ssp. n.

Sphaerophthalma pennsylvanica (Lep.)

This species cannot be differentiated racially in the forms north of Florida, in the female sex.

Distribution: Pennsylvania, Virginia, Georgia, North Carolina, Florida? Texas?

New records: Rockville, Pennsylvania, August 4, 1912; Willard, Missouri, August 25, 1920 (A. E. Brower); Deer Lodge, Tennessee. The last two records considerably extend the range of the species.

Sphaerophthalma pennsylvanica ssp. *pennsylvanica* (Lep.)

This, the southern race, or subspecies, does not seem to occur north of the Carolinas.

Distribution: North Carolina, Georgia, Florida, Texas?

New records: Ferguson, Louisiana, May 11, 1927; Baton Rouge, Louisiana, April 4, 1929 (L. Wright); Willard, Missouri, August 17. These records considerably extend the range of the species.

Sphaerophthalma pennsylvanica ssp. *scaeva* (Blake)

The northern subspecies occurs from Massachusetts to Virginia. The following records are new: Inglenock, Pennsylvania, June 27, 1912; Harrisburg, Pennsylvania, June 26, 1908; Angora, Pennsylvania, July 10, 1899; College Park, Maryland, July 29, 1931 (J. H. Roberts). This record somewhat extends the known range.

Sphaerophthalma pennsylvanica ssp. **floridensis** ssp. n.

This extreme southern race of *pennsylvanica* is quite distinct, in the female sex at least, from specimens found from Georgia northward.

The much more strongly infuscated pubescence and the deeper ferruginous body color separate it at once from the northern *pennsylvanica,* with the body color rather yellowish than ferruginous and the pubescence at most golden in color; *floridensis* also has some plumose hairs at the apex of the fourth tergite and sternite, laterally, which is lacking in all specimens of *pennsylvanica* seen, and has the petiole somewhat more coarsely sculptured above and fuscous pubescent except for the median plumose spot so characteristic of the species as a whole.

> Length 9.3 mm. Head above transversely rectangular, closely, densely confluently punctate, but not very coarsely so, each puncture bearing an infuscated hair on the frons and vertex, and silvery hairs below. Eyes with facets distinct,

length 0.58 mm.; length from eye to posterior mandibular articulation 0.66 mm. (1.1 as long as eye); length of head behind eyes about 0.85 mm. (about 1.5 the length of the eye). A truncate flange over the clypeus bears a border of long infuscated setae. Scape and pedicel dark ferruginous, bearing infuscated hairs; flagellum black, its first joint 0.30 mm. long, a fifth longer than the second. Maxillary and labial palpi dark brown.

Thorax closely confluently punctate, the pronotum so much so as to become transversely rugose through the prominence of the transverse borders of the punctures; bearing dark fuscous hairs dorsally and with fine silvery simple and plumose hairs scattered over the pleural areas. Legs blackish, the pubescence in large part a burnt golden, that of the ventral surface of the femora longer and silvery.

Petiole coarsely punctate dorsally (more so than in the species) bearing erect infuscated hairs, except at the apical margin, which is silvery plumose pubescent medially and densely appressed black pubescent laterally. Second tergite closely confluently elongate punctate, the punctures becoming sparser medially and apically, bearing dark setose hairs, except for a median transverse band of golden hairs and the apical margin of dense white plumose hairs. Second sternite very sparsely, shallowly setigerously punctate, the hairs silvery, fine and short; at apex with a dense border of plumose hairs; apical sternites similarly pubescent, but lacking plumose hairs, except the hypopygium which is partly infuscated long-setose, and the third and fourth sternites which have some plumose hairs laterally. Third tergite black pubescent except for a lateral band of plumose hairs on each side; fourth tergite partly black, partly silvery pubescent, also with a few plumose hairs laterally; fifth and sixth tergites partly silvery, partly infuscated pubescent, lacking plumose hairs.

Holotype: Sarasota, Florida, March 29, 1938 (J. C. Bradley), in collection of Cornell University, Type No. 2192.

The other published records of *pennsylvanica* from Florida may belong to this subspecies.

Sphaerophthalma boweri sp. n.

Male: Length 17–18 mm. Entirely deep ferruginous, except for the apical abdominal segments which are entirely black, and the legs which are practically black, and fuscous pubescent, except for apex of tergite three and subsquent tergites, which are black pubescent, and similarly the sternites.

Head transversely rectangular, almost quadrate, rather strongly developed behind the eyes, closely, rather finely, not confluently punctate. Posterior ocelli small, their maximum diameter 0.32 mm.; their distance apart 0.66 mm. (slightly more than twice their length); their distance from the front ocellus 0.30 mm. (slightly less than their length); their distance from the eye-margins 1.0 mm. (over three times their length). Eyes strongly hemispherical, black, shining, the facets indistinct, 1.0 mm. long (as long as distance between posterior ocellus and eye); length of head behind eyes 1.5 mm. (1.5 length of eye); length of distance between eye and posterior mandibular articulation 0.45 mm. (less than half the length of the eye). Mandibles broad, strongly angulate, as in *pennsylvanica,* obliquely truncate apically, tridentate, the basal two-third roughly punctured and hirsute; the dorsal edge keeled; incised below, but not dentate. Between and below the insertion of the antennae a short longitudinal carina runs down towards the clypeal region, which is transversely expanded and produced into a transversely rectangular lobe anteriorly, medially, in front of a concave, depressed area bearing five setae; the anterior lobe is slightly concave in front, and on each anterior, lateral corner bears a strong hirsute tubercle. The antennal tubercles are slightly further apart than the transverse diameter of the anterior ocellus. Scape and pedicel ferruginous, the flagellum infuscated; the hirsute scape infuscated erect and decumbent pubescent; pedicel less than half as long dorsally as first flagellar segment, which is an eighth shorter than the second; the latter slightly longer than the third flagellar article. Pubescence of head wholly infuscated, no silvery hairs present.

Thorax rather closely, moderately sculptured, the prothorax dorsally and laterally more coarsely and closely so. Mesonotum with the parapsidal furrows deep and strong, distinct their entire length, converging behind; the punctures rather close, less so than on pronotum; scutellum similarly sculptured, with long infuscated setose hairs. Propodeum conspicuously but not coarsely reticulate on its lateral and posterior faces, the reticulations becoming weaker laterally; the sides evenly rounded into the dorsal face. Mesopleura coarsely punctate below, less closely and coarsely dorsally. Pubescence of dorsum entirely an infuscated brown. Legs, except the ferruginous coxae, blackish, bearing infuscated pubescence except on the lower faces of the femora, which bear ivory-colored long hairs. Mesosterna entirely lacking any trace of tubercles or carinae. Wings strongly evenly infuscated, except for a hyaline spot on the apical third of each; cell 2nd $R_1 + R_2$ elongate, four times as long as high, apically obliquely truncate and not acuminate as in *auripilis;* vein R_4 forming an acute angle with R_{3+4} (a right angle in *auripilis*).

Abdomen with petiole entirely a burnt golden pubescent, the apical band including a dense band of plumose golden hairs; the integument deep ferruginous, infuscated posteriorly. Second tergite entirely ferruginous, burnt golden and fuscous pubescent; bearing at its apex a band of erect fuscous and appressed smaller, nearly hidden, golden plumose hairs; the felt lines of fuscous hairs. Apical tergites black, with erect black and setose hairs. Second sternite ferruginous, apically with long silvery hairs, the disk infuscated pubescent; the apex with golden plumose hairs. Apical sternites black, almost entirely black pubescent and setose, lacking all plumose hairs, as on the apical tergites.

Holotype: College Station, Texas, June 12, 1926, in the collection of the author.

This very distinct new species is closely allied to both *auripilis* and *pennsylvanica.* The presence of entirely brownish pubescence on the second tergite, while the apical tergites are black pubescent, will separate it from both species.

S. albiplumosa which is described below, is probably the female of either the present species, or of *S. auripilis.*

This species is named for Noah and Henrietta Bower, steadfast friends, who helped make this study possible.

Sphaerophthalma auripilis Blake

This species has been reported from Texas and Oklahoma; a single specimen is at hand: Kurrville, Texas, June 1, 1935 (M. A. Embury).

The following may represent the female sex.

Sphaerophthalma albiplumosa sp. n.

Female: Length 9.2 mm.

Head transversely rectangular, closely, deeply regularly punctate, bearing golden pubescence on frons and vertex, and silvery glittering hairs on the gular and genal regions, which are less closely punctate. Eyes black, weakly faceted, 0.68 mm.

long; their distance from the posterior mandibular articulation 0.60 mm. long (0.88 as long as eye). Clypeus with a flat, overhanging, wide, truncate flange, dorsally bearing a border of long, light golden setose hairs. Scape and pedicel ferruginous, the former coarsely but not confluently punctate, bearing glittering decumbent silvery hairs; pedicel about a half shorter than the first segment of the blackish flagellum; first flagellar segment 0.32 mm. long (1.35 as long as second).

Thorax obpyriform, closely confluently, in front rugosely punctured, bearing burnt golden hairs on top; the pleura with fine silvery simple hairs and shorter scattered plumose hairs.

Petiole coarsely punctate dorsally, bearing erect long, slightly infuscated hairs, except for the prominent apical band of dense, silvery plumose appressed hairs; entirely lacking any black appressed hairs laterally; deep ferruginous, blackish apically. Second tergite deep ferruginous, the disk slightly lighter, closely confluently punctate, the punctures elongate, running into each other so much that the base and disk of the tergite become irregularly longitudinally striate; lateral margins sparsely, distinctly punctate; pubescence dark fuscous, except for the dense, prominent band of silvery plumose hairs at the apex, and the few slender erect silvery hairs mixed with it. Apical tergites blackish at apex, the third entirely and fourth partly black pubescent, the fifth and sixth silvery pubescent; third and fourth tergites laterally with some plumose hairs. Second sternite very sparsely, shallowly punctate, the punctures rather large, each bearing a short silvery hair; apically with a dense band of plumose pubescence; apical sternites with apical bands of silvery simple hairs; the third and fourth with some plumose hairs laterally, in addition.

Holotype: Bexar Co., Texas, on the Carrizo Sands, 15–25 miles east of San Antonio, Sept.–Oct. 1941, in the collection of the author. *Paratype:* Helodes, Texas, June 20, 1925 (A. H. Wright), in the collection of Cornell University.

This species can be told from *pennsylvanica* by the entirely silvery band of the first tergite alone; it is very similar to *pennsylvanica* otherwise, but has the malar distance relatively shorter. It is, without much doubt, the female of either *auripilis* or *boweri,* possibly of *jason,* but since there is no indication of which male it belongs to I am forced to give it a name of its own.

Blake's description of *Mutilla balteola* (Trans. Amer. Ent. Soc., 13: 248) applies to the female of our eastern *pennsylvanica,* and not to the present species, since he distinctly says in the key (p. 225) "first segment fringed at apex with black, with a dot of white pubescence on middle of apical margin" and again in his description says: "basal segment clothed on middle of disk and apical margin with pale pubescence." Fox (1899) (Trans. Amer. Ent. Soc., 25: 250) evidently confuses the two for he says in his key to the female: "first and second segments banded with white pubescence," which would hold for the present species. He reports what thus is undoubtedly *albiplumosa* from Texas and Oklahoma. Blake's types of *balteola* came from the "Atlantic States; Texas"; thus true *pennsylvanica* may occur in Texas, although I have seen no specimens from there.

Photomorphus Viereck.

The genus was established by Viereck for diurnal forms, lacking plumose pubescence, that have small ocelli and distinct mesosternal processes in the male. The known distribution of the genus extends from New Jersey and Illinois to Iowa, Georgia and Texas. There are five species of males known, but only a single, evidently composite species of female. The situation thus is similar to that found in the genera *Ephuta* and *Timulla,* where the female sex is equally conservative as regards evolution into distinct segregates. The validity of this genus is to be questioned: the only apparently constant differences from *Sphaerophthalma* being the absence of plumose hairs and the presence of mesosternal processes. The presence or absence of plumose hairs appears to be at best a subgeneric character. As regards the mesosternal processes, their presence or absence cannot be regarded as very significant, since in one *Photopsis* at least (*daunus*), they are present or absent. It would seem wise, under these conditions, to regard *Photomorphus* as simply a subgenus of *Sphaerophthalma,* but I am leaving the two distinct until a revision of the genitalic structure of the Photopsidine wasps can be done.

KEY TO SPECIES OF PHOTOMORPHUS.

1. Female, wingless . . . . *myrmicoides* (Ckll.)
   Males 2
2. Vertex behind eyes very elongate; entirely black, mesosternum with a dentiform process in front of each coxa.
   banksi (Bdly.)
   Vertex not unusually elongate behind eyes, head transverse; mesosternal processes not in front of the coxae; not entirely black 3

3. Mesosternal processes longitudinally crenulate ridges; abdomen largely or entirely ferruginous 4
   Mesosternal processes transverse, blunt tubercles, somewhat crenulate at apex; abdomen entirely or largely black or piceus 5
4. Ocelli very small, the distance between the eye-margins and the posterior ocelli about five times the maximum diameter of the posterior ocelli; abdomen entirely silvery pubescent. *alogus* Viereck
   Ocelli larger, the distance between the eye-margins and the posterior pair about two and one-half times their greatest diameter; abdominal tergites six and seven fuscous pubescent ....*myrmicoides* (Ckll.)
5. Head, thorax and petiole red; gaster black or piceous; vertex closely punctured, front rugose .... *johnsoni* Viereck
   Entirely black, except for spot on propodeum and scutellum which are reddish-yellow; vertex sparsely, front obsoletely punctured .... *rubroscutellata* (Bdly.)

Photomorphus johnsoni Vier.

1903. *Photomorphus johnsoni* Viereck, Ent. News, 14:249, male,

1916. *Photomorphus johnsoni* Bradley, Trans. Amer. Ent. Soc., 42:332, male.

This species is our most frequently encountered eastern *Photomorphus*. The following females, listed as *"myrmicoides"* almost certainly belong to this species, as the known distribution of the two nearly coincides, and since the other three species of *Photomorphus* found in the east (*aloga, banksi,* and *rubroscutellata*) are, as far as it is known, much more rare and very limited in distribution. Mickel (Ann. Ent. Soc. Amer., 27:610) describes the male of *myrmicoides,* from materials from Sioux City, Iowa. It seems evident, then, that the female *myrmicoides* is in reality a composite species.

Distribution: New Jersey: Riverton (Type); Virginia: Falls Church.

The following specimens appear to represent a southern race of the species, and are described below.

Photomorphus johnsoni var **argentipilis** var. n.

Agreeing with the typical species except as follows: pubescence more silvery and propodeum evenly reticulate dorsally.

Pubescence of frons scarcely infuscated, that of the prothorax, scutellum and propodeum silvery, only that of the mesonotum at all, infuscated; abdomen entirely erect silvery pilose, except for tergite six and seven whose pubescence is in part moderately infuscated. Propodeum evenly reticulated, not bisected by a median longitudinal carina (lacking a double median area at base).

Holotype: Stone Mt., Georgia, June 7, 1917, in collection of Cornell University, Type No. 2193. *Paratype:* Southern Pines, North Carolina, May 23, 1911 (A. H. Manee).

The typical form of the species has the propodeum with a median longitudinal carina (and has a glabrous area at the base on each side of this carina) and has the apical abdominal segments and the apex of the second tergite dusky pubescent at apex.

Photomorphus myrmicoides (Cockerell)

1886. *Mutilla parvula* Blake, Trans. Amer. Ent. Soc., 13: 206, female.
1895. *Sphaerophthalma myrmicoides* Cockerell, Ent. News, 6: 62, female.
1897. *Mutilla myrmicoides* Dalla Torre, Cat. Hymen., 8: 65, female.
1897. *Mutilla parvulla* Dalla Torre, Cat. Hymen., 8: 71, female.
1899. *Mutilla myrmicoides* Fox, Trans. Amer. Ent. Soc., 25: 269, female.
1903. *Mutilla parvula* Andre, Gen. Ins., Vol. 1, fasc. 11: 62, female.
1903. *Mutilla impar* Melander, Trans. Amer. Ent. Soc., 29: 321, female.
1916. *Photopsis myrmicoides* Bradley, Trans. Amer. Ent. Soc., 42: 433, female.
1934. *Photomorphus myrmicoides* Mickel, Ann. Amer. Ent. Soc., 27: 610, female, male.

This species is undoubtedly composite, as understood at present. The eastern females, without much doubt belong to *Photomorphus johnsoni,* since the latter is the only eastern *Photomorphus* to get as far north as New Jersey (from which *myrmicoides* is also known). These probably correspond with Blake's *parvula,* which came from Alabama.

It is quite possible that the types of *parvula* Blake and *myrmicoides* Cockerell represent two species. In such a case, the eastern females would be left without a name, unless they could be definitely correlated with *johnsoni* Viereck. In that case, the latter name would hold for the females we now call *myrmicoides* that occur from Alabama and Georgia to New Jersey (i.e., in the Austral Zone of the eastern Coastal Plain and Piedmont regions). Cockerell's *myrmicoides* may therefore correspond to the females from Sioux City, Iowa, that Mickel calls *myrmicoides,* but belong to a different species of male than the eastern specimens.

To avoid confusion, I list the distribution for this composite species under two headings: Eastern and Western.

Distribution: Eastern: New Jersey: Ridgway, August 13, 1911 (W. T. Davis); Illinois: Brownfield, Ill., August 17, 1916; Virginia: Great Falls, June 27, 1911 (W. T. Davis), Falls Church (N. (Banks); North Carolina: Southern Pines; South Carolina: Clemson College, July 28, 1937 (O. L. Cartwright); Georgia: Atlanta, July 10, 1928 (P. W. Fattig); Atlanta, June; Dallas, June; Yonah Mountain, June; Clayton; Tennessee: Rives; Alabama: Holotype, of *Mutilla parvula* Blake (all these are females).

The records for New Jersey, Illinois and South Carolina are new, and greatly extend the known range of the species. The Southern Pines record and the Clayton record are from Bradley (1916); the Dallas and Yonah Mountain records from Fattig; the Rives record from Mickel.

Western: Fedor, Texas (types of *M. impar*); Riley Co., Kansas; Texas (type of *M. myrmicoides*); Sioux City, Iowa (Mickel), females and males.

Melander describes a variety of *parvula* (loc. cit.) with the pygidium finely granular and not striate which is almost certainly an entirely different species.

Photomorphus alogus Viereck.

1916. *Sphaerophthalma* (*Photomorphus*) *aloga* Bradley, Trans. Amer. Ent. Soc., 42: 332, male.

1903. *Photomorphus alogus* Viereck, Ent. News, 14: 249, male.

1943. *Photomorphus alogus* Fattig. Emory Univ. Bull., 1: 21, male.

This species is limited to Georgia (Atlanta, Aug. 2, 1913, R. and H.); Tifton (Holotype) and Mississippi (Lucedale, June 8, 1932, Henry Dietrich) in distribution, as far as known.

The latter record is new, and increases the range considerably further west.

Part of the females put under "*myrmicoides*" may be found to belong here eventually.

Photomorphus banksi (Bradley)

1916. *Sphaerophthalma* (*Photomorphus*) *banksi* Bradley, Trans. Amer. Ent. Soc., 42: 331, male.
1936. *Sphaerophthalma banksi* Brimley, Ins. N. C., 439.

This species has been recorded from Virginia (Falls Church, Great Falls) and North Carolina (Raleigh).

Part of the complex of females called "*myrmicoides*" may also belong here.

Photomorphus rubroscutellata (Bradley)

1916. *Sphaerophthalma* (*Photomorphus*) *rufoscutellata* Bradley, Trans. Amer. Ent. Soc., 12: 332, male.

This species is known only from the holotype, from Falls Church, Virginia.

Photopsis Blake.

This nearly entirely western genus has been divided into two genera by Viereck, *Photopsis* proper (lacking mesosternal processes) and *Odontophotopsis* (possessing mesosternal processes). Viereck did not utilize any other differentiating characters and there are nearly no others that hold. The presence or absence of mesosternal processes in itself can scarcely be considered of much value, since in one species (*daunus*) they may be present or absent in specimens from the same population; furthermore, the great amount of difference in shape, position and direction seem to indicate that they may have arisen independently several times.

The shape of the genitalia appears to be the most reliable criterion for separating *Sphaerophthalma* from both of the subgenera of *Photopsis*. In the former what appear to be homologous with the volsellae are strongly flattened, expanded, ligulate processes; in the latter these are apparently always cylindrical, slender and acuminate. Outside of this difference in the genitalia, *Sphaerophthalma* comes dangerously close to *Photopsis* proper, both of them possessing plumose pubescence and lacking mesosternal spines in the males, as contrasted with *Odontophotopsis,* which has mesosternal processes.

SUBGENUS *Odontophotopsis* VIERECK.

KEY TO EASTERN FORMS.

1. Females; with plumose hairs; wingless; the pygidium smooth, margined by a distinct carina; entirely silvery pubescent. **P. bradleyi**
Males; winged; lacking plumose hairs 2

2. Mesosternum with two transverse carinae; petiole strongly constricted apically, conspicuously nodose; posterior ocelli large, their distance from the eye-margins about twice their transverse diameter .... *P. paula* Bdly.
Mesosternum armed with two blunt, slightly transverse processes; petiole more weakly nodose, not strongly constricted at apex; posterior ocelli removed from eye-margins by more than three times their transverse diameter 3

3. Legs and antennae brown; the pubescence of the apical tergites and sternites golden brown; body rufo-ferruginous; pubescence long, pilose; veins of wings moderately infuscated; the apices of the wings weakly infuscated .... *P. spinci* Bdly.
Legs and antennae black; pubescence of tergites 5–7 and sternites 6–7 largely blackish; body red; pubescence shorter, less conspicuous; mesonotum dark fuscous pubescent; veins of wings deeply infuscated, the infuscation of the apices of the wings stronger.
P. spinci ssp. **floridensis** ssp. n.

Photopsis bradleyi sp. n.

Female. Length 3.9 mm. Entirely rufo-ferruginous, the legs and antennae slightly paler; pubescence chiefly silvery, that of the thoracic notum and second tergite chiefly decumbent and golden-ferruginous; and second abdominal segment and third tergite with bands of plumose, silvery hairs apically; pygidium defined laterally, nearly smooth, glabrous.

Head oval-obtrapezoidal, its width 0.95 mm. (slightly wider than the width of the thorax), rather closely, but by no means coarsely setigerously punctate on the vertex, the punctures similar, somewhat sparser on the genae, but becoming very close, contiguous to confluent on the frons, where the sculpture is nearly rugose; the integument is shining and polished between the punctures. Malar space about three-fourths the length of the eye (which is 0.34 mm. long and 0.26 mm. wide); the latter black, polished, with the facets not very distinct. Below and between the scapes a curved transverse flange projects down over the clypeus, nearly hiding the latter, and bears near its edge a row of stiff bristly hairs; the clypeus narrow, transverse; medially the supraclypeal flange is angulate obtusely, with a large, oval puncture at the apex of the angulation. The scapes short, strongly curved, coarsely, but not contiguously punctured, and bearing strong silvery pubescence; their length about that of the pedicel plus the first three flagellar segments; the pedicel obconic, subequal in length to the first flagellar, which is scarcely shorter than the second flagellar; third flagellar less than a fourth longer; the diameter of the first flagellar is slightly more at its apex than its length. Mandibles long acuminate, slender, not dentate within nor incised below; carinate externally on their upper margins; sparsely long pubescent to near their apices. Pubescence of head sparse, short, silvery, rather bristly, few of the hairs erect and longer, except at the very back of the vertex and occiput where the pubescence is erect, pilose, silvery.

Alitrunk longitudinally rectangular, dorsally about 1.15 mm. long and 0.90 mm. wide (about one and a fourth as long as wide), slightly narrower at the propodeum; closely, rather coarsely, deeply confluently, setigerously punctate; towards the propodeum the ridges between the punctures become asperated strongly; the propodeum is coarsely longitudinally wrinkled and asperate, the asperations in part spinose. Behind a line drawn through the prominently tubercular metathoracic spiracular openings there is a low median scutellar scale. The lateral pieces of the prothorax are with deep, but well-separated punctures above, smooth and shining below; mesopleura with a narrow vertical ridge with a row of very coarse punctures; microscopically setigerously punctate in front of these, under the slightly oblique, almost vertical, elongate mesothoracic spiracular openings; the lateral propodeal areas smooth and shining except for a few scattered punctures bearing hairs, angularly separated from the posterior face by elongate, longitudinal, crenulate ridges. The humeri of the pronotum are rectangular, weakly carinate, provided with an undulate, sharp, low carina on each side that becomes obsolete as it runs down the lateral pieces; the dorsal face separated from the more sparsely, setigerously punctured anterior face, which bears erect, silvery hairs. The notum of the thorax with decumbent golden hairs, more or less bristly and short, intermingled with much sparser erect, silvery hairs. The posterior propodeal face is long pilose with erect silvery hairs. The dorsal and lateral faces of the thorax nearly at right angles to each other, angularly separated, very sharply so in back. The posterior propodeal face at about a 110-degree angle with the thoracic notum. Legs paler, the coxae and femora sparsely pubescent with erect, long hairs; the tibiae with shorter, decumbent, silvery hairs; the tarsi with short, appressed, light golden hairs; the tibiae with two rows of stout spines, about five spines in each row, on their outer faces; the longer calcar of the posterior tibiae slightly less than three-fourths the length of the metatarsus; calcaria of the same color as the tarsi. Abdomen rather moderately sculptured, the punctures fine. Petiole short, wide, transverse, evenly rounded into the second tergite dorsally, without any visible constriction between the two; its nearly flat anterior face with abundant fine, erect, pilose silvery pubescence and small, fine punctures; ventrally weakly carninate medially, the carina obsolete posteriorly. Second tergite with well-separated, rather abundant, setigerous punctures; the pubescence short, decumbent, golden ferruginous, except for a scattered few erect, silvery hairs and an apical band of silvery, appressed, plumose hairs; felt-lines about a third as long as the tergite, measured laterally. Apical tergites sparsely pubescent, finely punctate; the hairs silvery, erect and appressed, those of the third tergite in part plumose. Pygidium carinate laterally, somewhat convex, smooth and glabrous. Second sternite more sparsely punctured than the second tergite, with erect and decumbent silvery pubescence, and some plumose bands in the weak apical band, laterally; apical sternites moderately to sparsely, finely punctured, erect and decumbent silvery pilose.

Holotype: Clemson College, South Carolina, August 2, 1937 (O. L. Cartwright), in the collection of the author.

This species represents the first female *Photopsis* found east of the Mississippi. The subgeneric position is not known, but, from the closeness in distribution it seems probable that it may be the female of either *P.* (*Odontophotopsis*) *paula* or *spinci.* It can be easily confused on superficial examination with the eastern females of *Photomorphus;* however, the entire absence of plumose pubescence and the presence of dusky pubescence on the apical tergites easily separates the latter from the present species; the two are similar in size.

The species is named in honor of Dr. J. C. Bradley, who has contributed practically all that is known about our eastern Photopsidine wasps.

Photopsis (*Odontophotopsis*) *paula* Bradley.

Only the types, from Spring Creek, Decatur Co., Georgia, are known.

Photopsis (*Odontophotopsis*) *spinci* Bradley.

Described from Bainbridge, Georgia (Holotype), from Southern Pines, North Carolina, and from a specimen labeled "Georgia," lacking further data. A specimen from Stone Mountain, Georgia, August 16, 1913, does not differ from the paratypes examined. This is the first record, except the type material.

Very close to *spinci,* but appearing very distinct because of the deeper red body color and duskier shorter pubescence is the following race or subspecies from Florida.

Photopsis (*Odontophotopsis*) *spinci* ssp. **floridensis** ssp. n.

> Differing from the species only in the deeper red ground color, black legs and antennae, blackish pubescence of the apical tergites and sternites, generally shorter, clipped-appearing pubescence; dark fuscous pubescent mesonotum, and more deeply infuscated veins of the wings.

The characters that separate this race, though only color characters and pubescence characters appear to be constant, since all the four types from Florida and the material of the species from Georgia and North Carolina are quite constant in their types of pigmentation.

Holotype: Englewood, Florida, April 11, 1944 (J. G. Needham). *Paratypes:* Englewood, Florida, April, 21, 1944, one male; March 26, 1944, two males (all collected by J. G. Needham), in Cornell University collection type. no. 2194. The first two specimens listed were marked as taken by light.

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Behavior of *Strauzia longipennis* var. *vittigera* Loew (Diptera, Trypetidae).—This species was apparently at the height of its mating period on May 21, 1944, at Detroit, Michigan. Many pairs *in copulo* and many excess males were found on the leaves of the wild sunflowers on which they cause galls. The males always fluttered their wings and turned to face another male whenever they espied one. They would approach each other and soon one would dash at the other and crawl over him. Sometimes the victim would turn the tables and crawl over his erstwhile attacker before the flies separated and flew away. Frequently two males would approach each other, bring their heads together and lower them until they touched the leaf on which they were standing. They would stand thus with their foreheads and the fore part of their thoraces butted against each other for several seconds, their peculiar black capitate frontal bristles intermingled, their wings fluttering and their abdomens in the air. This encounter was apparently considered a draw, since afterward both would fly off. No epigamic display was noticed since all females seemed to be mating. —George Steyskal, Detroit, Mich.

THE GENUS MENOSOMA (HOMOPTERA, CICADELLIDAE) AND A NEW GENUS SPATHANUS (HOMOPTERA, CICADELLIDAE).

By Dwight M. DeLong, Department of Zoology and Entomology, Ohio State University.

The genus *Menosoma* was described by Ball in 1931[1] to include *stonei* Ball which was described at that time and cited as the genotype, *cinta,* O. & B. var. *binaria* Ball, *tortolita* Ball, also described in the same paper, *Athysanus acuminatus* Baker and *Athysanus litigiosus* Ball. In 1941 the genus *Omanana* was described by the author and *Athysanus litigiosus* Ball was designated as the genotype. *M. tortolita* also belongs to the genus *Omanana. A. acuminatus* is definitely not a *Menosoma* and while more closely related apparently to *Omanana* it does not seem to belong to that genus. A new genus, **Spathanus** is therefore being erected at this time to include *A. acuminatus.*

Three species *stonei, cincta* and *mexicana,* the latter of which is described at this time are closely related species belonging to *Menosoma.* The vertices are different in length and angle, while the male genitalia are similar in the three species.

Menosoma stonei Ball.

Menosoma stonei Ball, Fla. Ent., 15: 5, 1931.

The vertex is short and appears almost parallel-margined. This species is more robust than *cincta.* The color is tawny with red veins and without banding. The elytra have several white areolar spots.

The apex of the aedeagus has two parallel blades. In *stonei* the anterior blade is wider and longer, in lateral view, than the posterior blade.

This species is known from Florida only.

Menosoma cincta (Osborn & Ball).

Eutettix cincta Osborn & Ball, Proc. Dav. Acad. Sci., 7: 97, 1898.

The vertex is more strongly produced and bluntly angled. About twice as wide between eyes at base as median length.

Color pale brown on vertex, pronotum and scutellum. Elytra white subhyaline, with a brown spot on anterior portion of clavus.

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[1] Florida Ent., 15: 4, 1915.

The posterior half is banded with dark brown except for a few pale spots especially on costal and apical portions.

The apex of the aedeagus has two narrow blades which are about the same in width and of approximately equal length.

It is distributed throughout the eastern United States.

Menosoma mexicana n. sp.

Resembling *cincta* in general appearance and coloration but more robust and with shorter, more bluntly angled vertex. Length 5–6 mm.

Vertex bluntly angled, short, more than two and one-half times as wide between eyes at base as median length.

Color: Vertex usually paler on anterior portion. In well-marked specimens with a small spot next each eye and a darker line or band across vertex between anterior margins of eyes. Pronotum with darker mottled spots. Basal angles of scutellum darker. Two small round spots on disc of scutellum. Elytra white, subhyaline with brown markings on anterior portion of clavus. The posterior half marked with brown so as to appear banded. The band is paler than in *cincta* and is sometimes absent. Face dark brown to black.

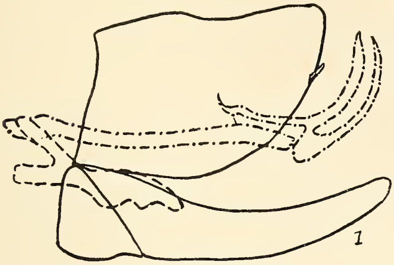
Genitalia: Female last ventral segment with lateral angles rounded to posterior margin which slopes gradually to a median produced pointed apex. Male plates long, tapered to acute apices. The plates are more narrowed and appressed on apical portion than in the case of either *cincta* or *stonei.* Style broad at base, abruptly narrowed just before apex forming a narrow finger-like tip. Aedeagus forming a pair of narrow parallel blades at apex. The anterior one is shorter and the two are about equal in width.

Holytype male collected at Tierra Blanca, Ver., July 29, 1932 by Dr. Dampf (M.F. 2655). Allotype female collected at Loma Bonita, Oax., June 8, 1937, by Dr. Dampf (M.F. 6070A). Paratype males and females from same localities, also from Tamazunchale, S.L.P., September 14, 1939, and September 25, 1941, Good and De Long, and Saltenango, Chiap., August 15, 1936, by J. Parra (M.F. 2076).

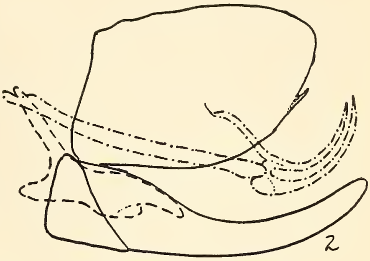
Genus **Spathanus** nov.

Related to *Menosoma* and *Omanana.* The vertex is produced and bluntly angled, not much wider between eyes than median length. In both *Menosoma* and *Omanana* the vertex is shorter and quite broad. The venation of the elytra is simple. The second

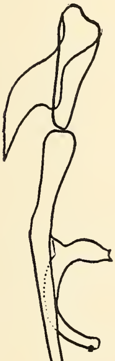
Plate III



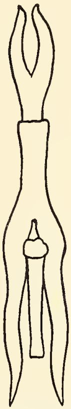
1 STONEI



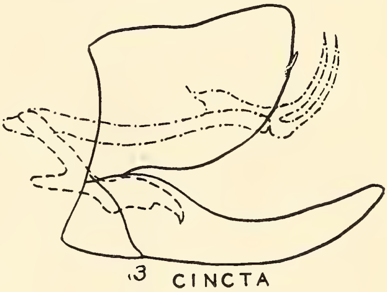
2 MEXICANA



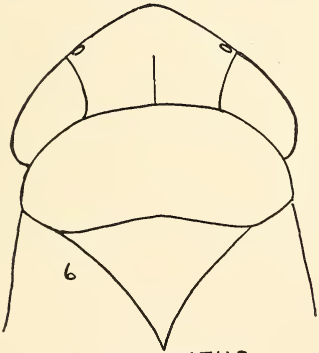
4 ACUMINATUS



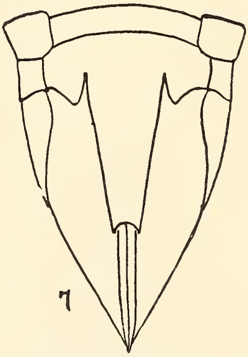
5 ACUMINATUS



3 CINCTA



6 ACUMINATUS



7 ACUMINATUS

anteapical cell is a little longer than the first. The apical portion of the costal margin is marked with pigment lines resembling nervures. The paired ventral processes of the male aedeagus show relationship to *Omanana,* but there is no dorsal process attached by a long petiole. The female genitalia are unique, forming a long broad apical spatulate process.

Genotype *Athysanus acuminatus* Baker.

Oman[2] has placed *acuminatus* in the subgenus *Conosanus*[3] the type of which is *obsoletus* Kirschb. The species of *Conosanus* are more closely related, however, to *Deltocephalus* in general structures and type of genitalia and the genotype as designated above does not show these relationships.

Spathanus acuminatus (Baker)

Athysanus acuminatus Baker, Psyche, 7: Sup. 1, 25, 1896.

A blunt-headed species with vertex produced and bluntly angled, about one-half wider between eyes at base than median length.

Female last ventral segment with lateral margins sloping to form a bluntly angled lobe either side of a median broad tooth which occupies the central half of the segment and is produced more than twice the length of the segment. This process is broad at apex and concavely emarginate between a pointed tooth on each outer margin. Male plates long, triangular with slender tapered apices. Style broad at base gradually tapered to a sharp pointed apex. Ventral paired processes of aedeagus rather long and robust. The dorsal portion seems fastened, more rigidly to the paired pieces and is without a slender base, as found in the species of *Menosoma.* The dorsal portion forms a broad U-shaped process.

This species is known to occur in the southwestern United States where it has been taken in Arizona.

EXPLANATION OF PLATE.

Figs. 1, 2 and 3. Lateral view of male genitalia of species of *Menosoma* as labelled.

Fig. 4. Lateral view of male genital structures of *Spathanus acuminatus.*

Fig. 5. Ventral view of male genitalia of *S. acuminatus.*

Fig. 6. Dorsal view of vertex, pronotum and scutellum of *S. acuminatus.*

Fig. 7. Ventral view of female genitalia of *S. acuminatus.*

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[2] Jour. Wash. Acad. Sci., 21: 17, p. 433, 1931.

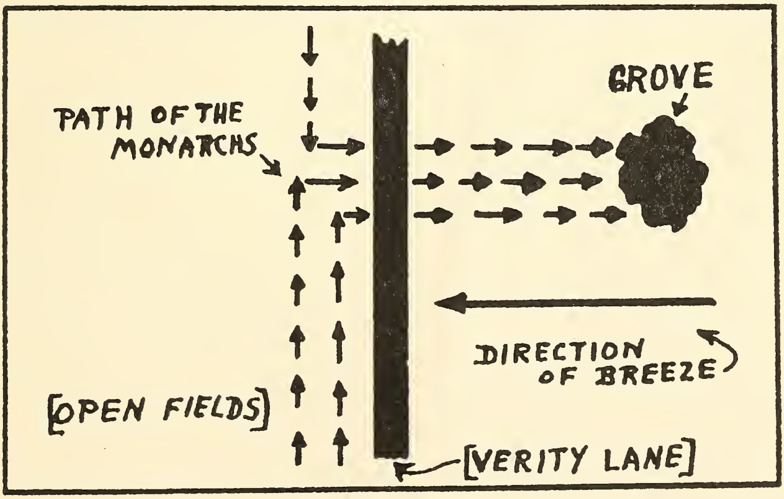
[3] Ohio Nat., 2, 237, 1902.

OBSERVATIONS ON THE MIGRATION OF THE MONARCH BUTTERFLY (ANOSIA PLEXIPPUS).

By Edwin Way Teale, Baldwin, N. Y.

During the early days of September, 1944, the movement of Monarch butterflies down the south shore of Long Island was greater than had been witnessed during any of a dozen previous years. Vast numbers of the insects congregated for the night in a small grove of oak and tupelo trees on the edge of a sea moor at the southern extremity of the town of Baldwin. Some of the branches contained as many as 100 butterflies to the foot.

On the evening of September 10, at 7:45 P.M., I was returning home with my wife after visiting the grove. We were walking north on a road known as Verity Lane about an eighth of a mile east of the trees on which the butterflies were congregating. A slight breeze was blowing from the west. We observed a Monarch flying south, parallel to Verity Lane and over open fields to the east. When it reached a position in line with the oak-and-tupelo grove, it made an almost right-angle turn and headed in that direction. A few minutes later, another Monarch flying further out over the fields came opposite the grove. It, too, made a sudden right-angle turn and flew straight for the spot where the butterflies were congregating. A little later, a third straggler appeared, flying northward over the fields. It, like the others, reached a point



opposite the grove and then turned suddenly and headed in that direction.

These observations suggest the possibility that the perfume from the scent-scales on the hind wings of the massed male Monarchs, carried by the breeze, may guide late-comers to the spot where the butterflies are congregating at nightfall. It is known that the honeybee (*Apis mellifera*) uses a similar method of attracting stragglers to the cluster at the time of swarming. The bees in the cluster open glands and, by fanning their wings, send scent-trails through the air which are followed by the bees that are still on the wing.

On the long flight south, in the autumn, the males and females are about equally divided among the Monarchs. But in the spring, when the return journey is made, females predominate. In fact, at one time it was believed that no males made the northward trip. While this has been proved an error, it is well known that the more scattered, individual, and less obvious northward migration is largely the work of the female butterflies. When the males are more numerous—during the southward flight—the insects tend to congregate and to fly in flocks or in straggling masses. When the males are extremely rare, during the flight north, such flocks are unknown. While many factors undoubtedly play their part, it seems entirely possible that the scent-pockets of the males may play an important part in holding together the great flocks of the Monarchs during their southward movement. The perfume of the male insects, previously thought of primarily as an aid during the mating season, may have another important function in the life of the Monarch.

On the 14th of September, while the migration of the butterflies was still in progress, Long Island was subjected to a hurricane which uprooted hundreds of trees in Baldwin. The eighty-mile-an-hour wind struck the grove where the Monarchs were in the habit of settling for the night. The evening before, I had seen a score clinging to an overhanging branch. The main body of the insects had passed on. During the night of the storm, six of the oak trees were uprooted. One was more than two feet in diameter. Yet, the next morning, among the fallen trees, a dozen Monarch butterflies—entirely unharmed and even unblemished—were sailing serenely about the grove. In all probability, they had weathered the storm on the lee side of the trunks of trees and close to the ground.

The branches which seemed favored by the butterflies as a night's resting place were between eighteen and twenty-five feet above the ground. Neither sounds nor movements on the ground below disturbed them in the least. But vibrations produced by the slightest tap on the branch would send the massed insects exploding in a fluttering cloud into the air.

"MEMBER'S CORNER" PERSONALS.

OTTO BUCHHOLZ, of Roselle Park, N. J., during the past summer spent three months on a collecting trip in and around the Great Dismal Swamp, on the borderline between Virginia and North Carolina. He made his headquarters near Holland, Va., eight miles from the edge of the swamp. Besides collecting approximately 2,000 specimens, he gathered data on 82 species of Virginia butterflies, including one or two new records.

ROWLAND R. MCELVARE, of Port Washington, Long Island, visited a number of entomologists on recent trips to Ithaca and Boston, where he stopped at the Comstock Museum, at Cornell, and at the Museum of Comparative Zoology, at Harvard. Dr. William T. M. Forbes' collection of the *Heliothis,* at Cornell, was examined with special interest. Dr. Henry Dietrich, Curator of the Comstock Museum, sent his greetings to other members of the Society.

DR. JOSEPH BEQUAERT, of the School of Tropical Medicine, Harvard Medical School, Boston, Mass., has returned to the United States after carrying on work for the Government in Africa.

WILLIAM T. DAVIS, of Staten Island, N. Y.—his legion of admirers and friends will be sorry to learn—has been confined to the Staten Island General Hospital, Tompkinsville, since late in July. He is recuperating from an operation. There, many of his friends visited him on his 82nd birthday, on October 12, 1944.

EDWIN WAY TEALE, of Baldwin, Long Island, who traveled 7,000 miles last year lecturing with Kodachrome moving pictures of insect life, is being booked for another tour this spring by the Clark H. Getts agency of New York City. His latest book, *Dune Boy,* is being brought out in England by a London publisher and is being translated for publication in Switzerland. A condensation appeared in the South American edition of The Reader's Digest as *"Chico de las Dunas."* A previous book, *Near Horizons* is being transcribed into Braille by the N. Y. Public Library.

DR. A. L. MELANDER, who retired from the chairmanship of the Department of Biology of the College of the City of New York, last year, has established a home in Riverside, California. He is continuing his hobby of photographing insects in full color.

1940 SUPPLEMENT TO THE COLEOPTERA FOUND LIVING IN AND ON VARIOUS FUNGI.

By Herman C. Moennich, Little Neck, N. Y.

The 1940 season began with one good day in June, then due to unfavorable weather conditions from June 7 to the end of July, the collecting was very poor. In August more specimens were found to be infesting the fungi. September was the best month for my investigations that year.

On examining hundreds of specimens of *Russula emetica* Persoon, I noted that this species of fungus is rarely attacked and very few specimens of Coleoptera were taken from it.

In Collybia radicata Fries.

Staphylinidae.

Hesperus apicalis Say. Tenafly, N. J., 7.VI.1940. 3 specimens.
Bolitobius pygmaeus Fab. Tenafly, N. J., 7.VI.1940. 1 specimen.
Bolitobius cinctus Grav. Tenafly, N. J., 7.VI.1940. 2 specimens.
Gyrophaena fasciata Say. Tenafly, N. J., 7.VI.1940. 328 specimens.
(taken on 12 specimens of *Collybia radicata*)

Nitidulidae.

Pallodes silaceus Er. Tuxedo, N. Y., 27.VII.1940. 2 specimens.

In Collybia platyphylla Persoon.

Phalacridae.

Olibrus pallipes Say. Suffern, N. Y., 30.VII.1939. 5 specimens.

Nitidulidae.

Amphicrossus ciliatus Oliv. Suffern, N. Y., 30.VII.1939. 1 specimen.

Staphylinidae.

Gyrophaena fasciata Say. Arden, N. Y., 30.VI.1940. 21 specimens.

In Amanita rubescens Persoon.

Nitidulidae.

Pallodes silaceus Er. Suffern, N. Y. 30.VII.1939. 5 specimens.

IN POLYPORUS SULFUREUS FRIES.

STAPHYLINIDAE.

Philonthus species. Suffern, N. Y., 30.VII.1939. 1 specimen.
Lathrobium species. Suffern, N. Y., 30.VII.1939. 1 specimen
Neobisnius species. Suffern, N. Y., 30.VII.1939. 1 specimen.

PHALACRIDAE.

Olibrus pallipes Say. Suffern, N. Y., 30.VII.1939. 15 specimens.

IN RUSSULA BADIA.

STAPHYLINIDAE.

Tachinus fimbriatus Grav. Haskell, N. J., 13.VII.1940. 1 specimen.

NITIDULIDAE.

Pallodes silaceus Er. Haskell, N. J., 13.VII.1940. 2 specimens.

IN INOCYBE ABUNDANS.

STAPHYLINIDAE.

Gyrophaena fasciata Say. Haskell, N. J., 13.VII.1940. 15 specimens.

IN ARMILLARIA MELLEA QUÉL.

STAPHYLINIDAE.

Oxytelus nanus Er. Haskell, N. J., 13.VII.1940. 2 specimens.
Tachinus fimbriatus Grav. Haskell, N. J., 13.VII.1940. 1 specimen.
Tachinus fimbriatus Grav. Haskell, N. J., 15.IX.1940. 15 specimens.
Gyrophaena fasciata Say. Haskell, N. J., 13.VII.1940. 11 specimens.
Gyrophaena fasciata Say. Haskell, N. J., 15.IX.1940. 5 specimens.
Atheta virginica Bnhr. Haskell, N. J., 13.VII.1940. 3 specimens.
Atheta frosti Bnhr. Haskell, N. J., 13.VII.1940. 2 specimens.
Oxyporus femoralis Grav. Haskell, N. J., 15.IX.1940. 1 specimen.
Oxyporus vittatus Grav. Haskell, N. J., 15.IX.1940. 6 specimens.
Oxyporus occipitalis Fauv. Haskell, N. J., 15.IX.1940. 3 specimens.

ON RUSSULA COMPACTA FROST & PECK.

HISTERIDAE.

Hister abbreviatus Fab. Tuxedo, N. Y., 27.VII.1940. 1 specimen.

STAPHYLINIDAE.

Gyrophaena flavicornis Melsh. Staten Is., N. Y. 11.IX.1940. 3 specimens.

Gyrophaena fasciata Say. Staten Is., N. Y., 11.IX.1940. 8 specimens.

ON BOLETUS PALLIDUS.

STAPHYLINIDAE.

Bolitobius anticus Horn. Tuxedo, N. Y., 27.VII.1940. 1 specimen.

ON PANUS STRIGOSUS.

EROTYLIDAE.

Triplax thoracica Say. Sloatsburg, N. Y., 18.VIII.1940. 1 specimen.

MYCETOPHAGIDAE.

Mycetophagus bipustulatus Melsh. Sloatsburg, N. Y., 18.VIII.1940. 1 specimen.

ON BOLETUS ALVEOLATUS BERK. & CURT.

STAPHYLINIDAE.

Hesperus apicalis Say. Sloatsburg, N. Y., 18.VIII.1940. 1 specimen.

HISTERIDAE.

Platysoma lecontei Mars. Sloatsburg, N. Y., 18.VIII.1940. 1 specimen.

ON RUSSULA BIFIDA.

STAPHYLINIDAE.

Staphylinus fossator Grav. Sloatsburg, N. Y., 18.VIII.1940. 3 specimens.

ON LACTARIUS PIPERATUS FRIES.

STAPHYLINIDAE.

Gyrophaena fasciata Say. Sloatsburg, N. Y., 18.VIII.1940. 7 specimens.

Gyrophaena fasciata Say. Staten Is., N. Y., 11.IX.1940. 3 specimens.

Atheta species. Staten Is., N. Y., 11.IX.1940. 4 specimens.

NITIDULIDAE.

Amphicrossus ciliatus Oliv. Staten Is., N. Y., 11.IX.1940. 2 specimens.

PHALACRIDAE.

Stilbus apicalis Melsh. Staten Is., N. Y., 11.IX.1940. 1 specimen.

ON CLITOCYBE ORCELLA.

STAPHYLINIDAE.

Gyrophaena fasciata Say. Sloatsburg, N. Y., 18.VIII.1940. 6 specimens.

Bolitobius cinctus Grav. Sloatsburg, N. Y., 18.VIII.1940. 1 specimen.

ON CLITOCYBE CLAVIPES QUÉL.

STAPHYLINIDAE.

Gyrophaena fasciata Say. Arden, N. Y., 30.VI.1940. 38 specimens.

ON RUSSULA CYNOXIA.

STAPHYLINIDAE.

Atheta frosti Bnhr. Sloatsburg, N. Y., 18.VIII.1940. 2 specimens.

ON COLLYBIA ACERVATA KARST.

STAPHYLINIDAE.

Gyrophaena fasciata Say. Arden, N. Y., 30.VI.1940. 18 specimens.

Gyrophaena fasciata Say. Sloatsburg, N. Y., 18.VIII.1940. 9 specimens.

Atheta frosti Bnhr. Sloatsburg, N. Y., 18.VIII.1940. 2 spcimens.

ON LACTARIUS VOLEMUS FRIES.

STAPHYLINIDAE.

Atheta frosti Bnhr. Sloatsburg, N. Y., 18.VIII.1940. 2 specimens.

ON POLYPORUS BETULINUS.

STAPHYLINIDAE.

Oligota pusillima Grav. Sloatsburg, N. Y., 18.VIII.1940. 1 specimen.

ON AMANITA PHALLOIDES QUÉL.

STAPHYLINIDAE.

Gyrophaena flavicornis Melsh. Staten Is., N. Y., 11.IX.1940. 4 specimens.

Gyrophaena fasciata Say. Staten Is., N. Y., 11.IX.1940. 5 specimens.

Atheta virginica Bnhr. Staten Is., N. Y., 11.IX.1940. 3 specimens.

NITIDULIDAE.

Pallodes silaceus Er. Staten Is., N. Y., 11.IX.1940. 5 specimens.

EROTYLIDAE.

Tritoma biguttata Say. Staten Is., N. Y., 11.IX.1940. 4 specimens.

Tritoma sanguinipennis Say. Staten Is., N. Y., 11.IX.1940. 1 specimen.

ON RUSSULA EMETICA PERSOON.

STAPHYLINIDAE.

Atheta frosti Bnhr. Staten Is., N. Y., 23.VIII.1940. 2 specimens.

NITIDULIDAE.

Pallodes silaceus Er. Tuxedo, N. Y., 27.VII.1940. 3 specimens.

Pallodes silaceus Er. Staten Is., N. Y., 23.VIII.1940. 1 specimen.

ON BOLETUS BICOLOR PK.

STAPHYLINIDAE.

Bolitobius cinctus Grav. Staten Is., N. Y., 23.VIII.1940. 1 specimen.

ON CLAVARIA AUREA FRIES.

NITIDULIDAE.

Pallodes silaceus Er. Staten Is., N. Y., 23.VIII.1940. 2 specimens.

ON PLUTEUS CERVINUS QUÉL.

STAPHYLINIDAE.

Gyrophaena flavicornis Melsh. Staten Is., N. Y., 11.IX.1940. 2 specimens.

NITIDULIDAE.

Pallodes silaceus Er. Staten Is., N. Y., 11.IX.1940. 4 specimens.

ON COLLYBIA VELUTIPES QUÉL.

STAPHYLINIDAE.

Gyrophaena fasciata Say. Staten Is., N. Y., 11.IX.1940. 2 specimens.

NITIDULIDAE.

Stelidota geminata Say. Staten Is., N. Y., 11.IX.1940. 1 specimen.

ON RUSSULA VIRESCENS FRIES.

STAPHYLINIDAE.

Gyrophaena fasciata Say. Staten Is., N. Y., 11.IX.1940. 2 specimens.

NITIDULIDAE.

Pallodes silaceus Er. Staten Is., N. Y., 11.IX.1940. 1 specimen.

ON BOLETUS SCABER BULL.

STAPHYLINIDAE.

Gyrophaena fasciata Say. Staten Is., N. Y., 11.IX.1940. 2 specimens.

Atheta virginica Bnhr. Staten Is., N. Y., 11.IX.1940. 1 specimen.

NITIDULIDAE.

Pallodes silaceus Er. Staten Is., N. Y., 11.IX.1940. 2 specimens.

ON RUSSULA FOETENS FRIES.

STAPHYLINIDAE.

Gyrophaena fasciata Say. Staten Is., N. Y., 11.IX.1940. 7 specimens.

Bolitobius pygmaeus Fab. Staten Is., N. Y., 11.IX.1940. 1 specimen.

ON POLYPORUS GIGANTEUM.

STAPHYLINIDAE.

Tachinus fimbriatus Grav. Haskell, N. J., 15.IX.1940. 2 specimens.

Philonthus fusiformis Melsh. Haskell, N. J., 15.IX.1940. 2 specimens.

Deinopsis americana Kr. Haskell, N. J., 15.IX.1940. 1 specimen.

Gyrophaena fasciata Say. Haskell, N. J., 15.IX.1940. 1 specimen.

NITIDULIDAE.

Stelidota geminata Say. Haskell, N. J., 15.IX.1940. 1 specimen.

PHALACRIDAE.

Olibrus pallipes Say. Haskell, N. J., 15.IX.1940. 1 specimen.

Plinthisus *martini* Van Duzee 1921 (Hemiptera, Lygaeidae), a Synonym.—In preparing the keys for my Synopsis Part III, a minute and careful checking and comparison of the original descriptions (the only ones) reveals identity of critical characters in *Plinthisus longisetosus* Barber 1918 (Proc. Ent. Soc. Wash., XX, p. 110) and *Plinthisus martini* Van Duzee 1921 (Proc. Cal. Ac. Sci., (4)XI, p. 114). *On the face of the descriptions,* the two species are one and the same. The synonymy stands this:

Plinthisus longisetosus Barber 1918 = *Plinthisus martini* Van Duzee 1921.—J. R. DE LA TORRE-BUENO, Tucson, Ariz.

The Prey of *Crossocerus pammelas* Pate (Sphecidae).—While painting his house in Detroit, Michigan, on October 1, 1944, the writer noticed a small black wasp with a prey trying to enter a hole between the mossy shingles at the edge of the roof. The wasp and prey were captured and readily determined, the wasp as *Crossocerus* (*Blepharipus*) *pammelas* Pate (= *ater* Cr., nec. Oliv.) and the prey as a female leaf-hopper, *Empoasca* (*Kybos*) sp. (possibly *obtusa* Walsh or *patula* DeLong). Pate in his revision of the subgenus (1943, Lloydia, 6: 267) gives a resume of the ethology but nothing is stated concerning the present species. — GEORGE STEYSKAL, Detroit, Mich.

Note on Preparing Diptera.—Small flies which are to be mounted on points or minuten nadeln often come out of the killing bottle with their wings folded against the sides of the body. The writer has found that the best way to get the wings into a more desirable position is to place the fly feet downward in the trough formed by the opposed thumb and forefinger and to press it gently on the dorsum of the thorax with the side of a large pin or pencil point. The wings will usually flip upward before enough pressure is applied to dent the dorsum.—GEORGE STEYSKAL, Detroit, Mich.

A METHOD OF DETERMINING FOOD PLANTS OF LEPIDOPTERA.

By John D. Ritchie, Wallwort, Saskatchewan, Canada.

There is a little blue *Lycaenid* common in this district, and until last summer I was unable to find out its food plant. No matter how carefully I watched I could never detect the female ovipositing on any plant. I spent hours following them but had no luck in finding out that for which I was looking. A female would light on a leaf, walk around a bit, sun itself, fan its wings, and away it would fly, with me following behind and the same thing would happen all over again. Finally, disgusted, I went to the cabin and consulted Holland's Butterfly Book and under the generic description of *Lycaena* is said:—"Caterpillar—Slug-shaped, feeding upon the petals and bracts of flowers, or upon delicate terminal leaves." Now I was bound to have them oviposit on a leaf. No wonder I could never catch my little blue at the egg-laying. I went right back out and in a few minutes I saw one ovipositing on the flowers of *Cornus stolonifera,* and as far as I can determine it is the only plant on which this particular Lycaenid oviposits.

I have watched the following ovipositing: *Grapta comma* on nettle. *Vanessa J-album* on birch, *Vanessa milberti* on nettle. *Pyrameis huntera* on everlastings, *P. cardui* on thistles, *Basilarchia arthemis* on willow, poplar, birch and once on pin cherry, and many other species I have observed laying eggs. By obtaining eggs in this way I have many times reared specimens to the adult stage. Nearly everyone has seen *Pieris rapae* ovipositing on cabbages.

There is a little Terias species here that I caught ovipositing on a plant that I am unable to identify.

Did any of my readers ever find the eggs of the *Argynnis* species on the food plant? Nearly or all the caterpillars of this genus feed on violets. I have searched in vain for the eggs on the leaves and last summer I believe I found out why I never could find them. I was watching a female which plainly showed by its actions that it was about to oviposit. Watching closely through my field-glasses, I carefully marked the spot where it flew to the ground and there on the under side of a dried leaf was the egg. There were numerous violets growing all around. Why did she not lay the egg on the plant? Would someone give the reason for this? I do not say that all the Arginnids oviposit in this manner but it is strange that I have never found eggs on the plants and I have searched for them many times.

Epargyreus tityrus oviposits on *Desmodium* in Western Canada. They are the fastest butterfly egg-layers that I have ever seen, almost as fast as the bombyliid flies. They merely touch the leaf and the egg is there. When seen under a lens the egg is indeed a beautiful thing.

Moths are much harder to detect in their egg-laying, as most of them fly at night, but I have seen, by lantern light, a *Polyphemus* ovipositing on *Corylus rostrata* here at Wallwort. It is a low-growing hazelnut bush. The diurnal species, of course, can be watched but most of them are such fast fliers.

I was standing, one hot afternoon, two years ago, among a thicket of *Epilobium,* the food plant of *Deilephila intermedia* here, when one of these moths flew up, right in front of me, and tucked an egg on the stem of a plant. She flew a short way and put another egg on the midrib of a leaf. She hovered around a few seconds and darted off.

Now, by close observation, it is possible to find the food plants of most of the butterflies and some of the moths in this way. So many times in works on the Lepidoptera one sees,—"Early stages unknown." "Early stages hitherto undescribed." "These await description," etc. That master lepidopterist, Holland, on page 4 of his Butterfly Book says, "The eggs are laid on the food-plant, upon which the caterpillar, after it is hatched, is destined to live, and the female reveals wonderful instinct in selecting plants which are appropriate to the development of the larva."

It is certain that she makes few mistakes.

Monarch Butterflies from the Sea.—Now and again vast swarms of butterflies, in this country *Anosia plexippus,* migrate or fly, generally over land. Little understood atmospheric conditions have taken such swarms over the sea, sometimes as far as 500 miles from the nearest land.

On the last day of August of this year a great swarm of Monarchs flew into Deal, N. J., from the sea, to the wonder of the natives. The "New York Times" reports this occurrence and suggests that a lepidopterist explain it. Here is a confession of ignorance from a hemipterist. There are enough records of vast numbers of insects met with in swarms far from land; but as yet nobody has offered a complete explanation of this phenomenon, familiar to entomologists because of the extensive wind-rows of insects sometimes found on the ocean tide-line, and at others, on the shores of our Great Lakes.—J. R. DE LA TORRE-BUENO, Tucson, Ariz.

A KEY TO THE NORTH AMERICAN SPECIES OF THE GENUS SUILLIA R.-D. (DIPTERA, HELOMYZIDAE).

By George Steyskal, Detroit, Michigan.

After considerable experience with the keys to the genus *Suillia* contained in Aldrich and Darlington (1908) and Czerny (1924, in German) the writer felt that a new key to the North American species was desirable and offers the following in the hope that it will prove an aid in determining these flies.

Since the arista is all too frequently lacking in material to be determined, an attempt has been made to obviate as far as possible dependency upon antennal characters. The wing picture, although usually faint, seems dependable and is easy to recognize once it is grasped and becomes useful as a catch-character. Certain characters of the legs of the males are very useful. The "cerebral hairs" are a small, dense double patch of hairs on the back of the head immediately above the neck.

Key to North American Species of Suillia.

1 (8). Head with black areas on each side of ocellar triangle or wings with dark spots in cells besides darkening of costal region and crossveins (Mexican species) 2

2 (5). Wings with dark spots in cells 3

3 (4). Numerous spots in all wing-cells. *polystigma* V. d. Wulp

4 (3). Two spots in first posterior cell and one or two in cells anterior thereto .... *distigma* V. d. Wulp

5 (2). Black areas each side of ocellar triangle 6

6 (7). Infuscation about posterior crossvein extending both ways along fourth vein, forming a T-shaped mark *iniens* G.-T.

7 (6). Clouding of posterior crossvein not extending along fourth vein .... *punctulata* V. d. Wulp

8 (1). Otherwise (species from north of Mexico) 9

9 (18). Mesopleura haired, at least a few hairs before the pteropleural suture 10

10 (11). Scutellum bare except the sides; posterior border of mesopleura bearing hairs; wings with ends of longitudinal veins with distinct brown spots; arista short-pubescent (D. C. [Lw.]; New England [Jns.]; N. Y. [Leonard]; Nova Scotia [v. i.]) .... *apicalis* Lw.

11 (10). Scutellum more extensively haired 12

12 (13). Arista short-pubescent; a blackish spot between each eye and antenna; mesopleura with numerous strong hairs; end

of longitudinal veins strongly infuscated; fore femora blackish; hind tibiae with spot or band at proximal end; dorsum of thorax dotted at bases of hairs and bristles (N. M., S. D., Mont. [Darlington]; Ore. [Cole and Lovett]; Ariz., Calif.) .... *barberi* Darl.

13(12). Arista long pubescent to plumose 14

14(17). End of longitudinal veins with distinct infuscation; dorsum of thorax dotted at bases of hairs and bristles; orbito-antennal spot present 15

15(16). Eyes in life with a crossband in the upper third (Europe; Colo. [Czerny.]) .... *nemorum* Mg.

16(15). Eyes in life unicolorous; fore femora largely pale (widespread in nearctic region) .... *assimilis* Lw.

17(14). End of longitudinal veins not infuscated, but the whole costal region faintly so, except narrowly along the second vein, also a faint longitudinal stripe in center of first posterior cell; orbito-antennal spot absent; thoracic dorsum not dotted; mesopleura with only a few hairs before the pteropleural suture (or none); *male:* fore and middle legs with long, usually prostrate hairs on ventral side of tibiae and posterior side of metatarsi (northeastern North America) .... *longipennis* Lw.

18(9). Mesopleura entirely bare.
19 (cf. also *S. chaetomera,* below).

19(22). Head distinctly higher than long, eyes high-oval; thoracic dorsum dotted; crossveins clouded 20

20(21). Scutellum with hairs on margin between bristles only; *male* unknown (Calif.; Czerny 1926) .. *sororcula* Czerny

21(20). Scutellum haired on entire dorsal surface; heaviest spot at end of second longitudinal vein; *male* with erect longish hairs on ventral and posterior sides of middle tibiae and posterior side of middle metatarsi (eastern North America) .... *quinquepunctata* Say

22(19). Head at least as long as high, eyes roundish 23

23(26). Scutellum without evident hairs on dorsum 24

24(25). Wings entirely hyaline; arista pubescent; *male:* fore and hind femora greatly thickened; a short, stout, downwardly directed thorn at anterior distal end of fore metatarsi; fore femora and coxae with very long hairs below; middle coxae with a thick tuft of black hairs (northernmost States, Canada, and Alaska; = *S. zetterstedti* and *S. bicolor* auctt.) .... *loewi* Garrett

25(24). Wings strongly infuscated along costa and cross-veins;

arista plumose; *male:* no thorn on anterior metatarsi, no long hairs on middle tibiae (Calif., Wash., Ore.). *limbata* Thomson

26(23). Scutellum with easily perceptible hairs on dorsum; arista plumose; wings with tinted areas 27

27(28). Hairs of dorsum of scutellum largely confined to basal half; wings with distinct brown spots at end of second to fourth longitudinal veins; cerebral hairs blackish; *male:* femora not remarkably enlarged, femora and tibiae without hairs longer than the diameter of those parts (widespread, mostly in East) .... *plumata* Lw.

28(27). Hairs evenly distributed over whole surface of dorsum of scutellum; infuscation of wing light, not in the form of spots at the end of longitudinal veins; cerebral hairs yellow or reddish (cf. 17 above) ...... *longipennis* Lw.

Suillia apicalis (Loew)

Helomyza apicalis Loew, 1862. Berl. Ent. Zts., 6: 226 (Cent. 2, no. 86 (translation, Aldrich and Darlington, 1908, Trans. Amer. Ent. Soc., 34: 96).

Since no description other than that of Loew is available, the following notes based on a male specimen kindly loaned by Cornell University are offered. The specimen was collected at Truro, Nova Scotia, 13 July 1913, by R. Matheson, and bears a determination label of C. B. D. Garrett. It agrees well with Loew's description.

Crossveins and end of second vein strongly spotted; marginal cell and upper half of submarginal cell yellowish; thoracic dorsum without spots at bases of hairs and bristles; aristal pubescence about as long as diameter of base of arista; eyes roundish; cheeks one-third eye-height; cerebral hairs black; about a dozen hairs near posterior margin of mesopleura; middle tibiae and metatarsi with longish erect posteroventral hairs; front metatarsi without claw; femora distinctly swollen; a few hairs on each side of upper surface of scutellum.

Suillia chaetomera Czerny, 1930, Konowia, 12: 236.

It has not been possible to place this species in the key; the following translation of the description is therefore given.

"The only specimen at hand was not well matured. Wholly pale yellow, only the antennae reddish yellow and the front between the ocellar triangle and the orbital plates somewhat browned. Front posteriorly very broad, more than half the total width of head, anteriorly strongly narrowed, above the antennae half as broad as the vertical diameter of the eyes, short and fine-haired, a moderately long vibrissa on each side. Third antennal joint short-oval, arista black, pale yellow at base, long-plumose, proboscis and palpi pale yellow. Hair of mesonotum very short and fine, mesopleura bare, one sternopleural bristle preceded by a row of smaller bristles; scutellum bare, only with a few hairs between the marginal bristles. Wing rather dark, crossveins black-seamed, the ends of the second to fourth longitudinal veins scarcely approaching each other, costal bristles moderately long. Calypters white, with pale yellow fringe. The three last tarsal joints brownish, fore femora below with long black and yellow hairs, middle femora anteroventrally with dense black setulae, posteroventrally from the base outwards with short and long black hairs, in the apical third with dense black setulae, hind femora below from the base outwards with long, pale hairs, from behind the middle not quite to the tip antero- and posteroventrally with long black bristles (in the specimen at hand partially broken off), anterior tibiae (t_1) on inner side of apical half with dense yellow setulae, middle tibiae (t_2) at the metatarsus inwardly with moderately long yellow hairs, middle coxae outwardly with approximately four and anteriorly with dense long black bristles. The black marginal bristles of the abdominal segments are long and strong. Hypopygium moderately large. —One male from California, May 17. 5mm."

LITERATURE CITED

Aldrich and Darlington. 1908. The dipterous family Helomyzidae, Trans. Amer. Ent. Soc., 34: 67–100, pls. 3–5.

Czerny, L. 1924. Monographie der Helomyziden, Abhandl. zool.–bot. Ges. Wein, 15(1): 1–166, pl. 1.

1933. Ergänzungen zu meiner Monographie der Helomyziden. VIII. Konowia, 12: 236–238.

MAILING DATE OF OCTOBER BULLETIN—This date on the cover page is given as November 16. Owing to press difficulties, actual mailing date is November 27.—Editor.

A FEW NOTES ON THE BEHAVIOR OF VESPULA MACULIFRONS BUYSS.* (G. A. SANDHOUSE).

By Phil Rau, Kirkwood, Missouri.

At various times between April 17 and April 28, 1938, queens of *V. maculifrons* were seen to enter crevices and burrows in the clay bank at Kirkwood, Mo., which harbored various species of mining bees; they have also been seen to enter the burrows of the carpenter bee, *Xylocopa virginica,* in the wooden boards above the clay bank. They were probably seeking nesting sites or insect prey, but when they behaved in the same way at 4:15 P.M., I suspected they were seeking shelter for the night.

They are early risers; I saw a queen foraging in a *Xylocopa* burrow as early as 4:45 A.M. on June 3, 1934. Incidentally, it seems that at so late a date the queen should have had workers to relieve her of this task, but she evidently goes out foraging after the workers are on hand, for I have found them foraging at Kirkwood as late as June 23, 1932.

I have seen workers feed upon grape jelly, discarded watermelon, and decayed apples; they feed on grapes as they hang on the vine, after the birds peck them open. They carried away gulletful after gulletful of grape juice and peach juice that was placed out for them in a dish. They carried away, just as greedily, raw beef as well as roast pork. Dozens of wasps were seen to enter the head of a dead robin and fly out with big chunks of red meat in their mandibles.

Workers of this wasp were feeding upon decayed apples as late as November 7, 1939. About 40 were taken; all of them workers. They were brought into the laboratory but died from 5 to 15 days later, even though they were well-fed.

The queens hibernate in the same position as do *Vespula maculata;* one was seen clinging to the wall of an old beehive on October 9, 1937, her body in a diagonal position, with head upwards, her wings tucked under her body and held down with her legs. The temperature rose that day to 72 degrees F., and next morning I found that while the wasp had not moved from the spot, she did change her position from a diagonal to a vertical position.

The queens in the early spring frequent flowers. I have often seen them in early May go deep into the flowers of the yellow Iris and come out with the sparse hair on their bodies heavily laden with pollen. I have also seen several queens in middle May, licking the outside of Iris petals, apparently collecting the waxy secretion, just as I have seen *Polistes* wasps collect it from peony buds (Bull. Brook. Ent. Soc., 34: 41, 1939) but I do not know for what purpose they collect it.

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* Kindly identified by the late Grace Sandhouse.

In May 1930, an unusually large number of diptera, *Spilomyia hamifera* Loew (C. T. Greene) were attracted to the clay bank at Kirkwood. This fly, in my opinion, is a very good mimic of the yellow-jacket, *Vespula maculifrons,* and I have often mistaken it for the wasp, but what the relationship is between model and mimic I do not know.

A worker of *V. maculifrons* fell prey to the robber-fly, *Deromyia platypterus* Loew (C. T. Greene) on July 29, 1930. The robber-fly was at rest on a fence post at Kirkwood quietly sucking the life-blood of the wasp. Sometimes, however, the tables are turned, for Bromley records (Duncan, Biol. N. A. Vespine Wasps, p. 107, 1939) an instance where the bald-face hornet, *Vespula maculata,* fed on a sister species, *Deromyia umbrina.*

POWER OF COMMUNICATION AMONG WASPS.

On September 11, 1932, a pork roast giving forth a strong odor was cooling on the kitchen porch, and for more than an hour a worker *maculifrons* tried to enter the screening. Finally I pinned a generous portion of the meat to the outside wall and had the pleasure of seeing her alight on it, cut out a large chunk, and fly with it to the nest and at the same time make one of the most elaborate flights of orientation I have ever seen a wasp make. During the next few hours there were as many as four wasps at the meat at one time. It makes one want to know whether the discoverer of the meat had a way of communicating about it to the others—probably after the manner and method of honey-bees, or whether the others independently discovered it, perhaps by means of smell. It is hard to decide from one observation, because if one wasp could communicate the good news to others, why did only four come to the meat? At so late a date the colonies are quite large, and one would expect a greater number to respond; but on the other hand, if they can independently be attracted by odor, why was it that only one wasp was attracted to it originally?

Thanks to all our friends who have so kindly responded to our plea for MSS. in the October Bulletin.—The Publication Committee.

BOOK NOTES.

Two important works are before the writer, each very much worthwhile in its own field, because of its great usefulness. The first is:

A Source-Book of Biological Names and Terms, by Edmund C. Jaeger. Pp. i–xxvi + 1–256, with numerous illustrations in the text. 1944. Charles C Thomas, Springfield, Illinois. ($3.50.) Reading through a dictionary is not usual; but this one has been read through, page by page. As a purely personal view, this reviewer, a constant user of word-books, has never liked the narrow-column, small-type page of dictionaries, which is really a fossilized hangover from the primitive lexicographers. But this is "painting the lily"; for the outstanding fact remains that this work is an absolute necessity to every working biologist, especially so to descriptive entomologists. It explains the meaning and extent of the names of animals bestowed by the founders and it is an invaluable aid to those that invent new names. In this view, it becomes an inportant part of every biological library. Dr. Jaeger is to be congratulated in giving us so very important and so very useful a work as this; and Charles Thomas is worthy of all praise in producing it under the difficult conditions we face today.

Entomología Agrícola del Perú—Manual para Entomólogos, Ingenieros Argónomos, Agricultores y Estudiantes de Agricultura, by Johannes E. Wille T. Pp. i-vii + 1–468. 1943. Published by Estación Experimental Agrícola de La Molina. Dirección de Agricultura, Ministerio de Agricultura, Lima Perú. (No price given.)

This is the first comprehensive work on entomology produced in Perú, and for that reason is a landmark in South American entomology. It is another evidence of the growth of scientific work in Latin America

Entomología Agrícola treats the harmful insects according to the crops attacked: as insects of cotton, of sugar cane and of cereals; tropical insects, fruit and vine insects, farm and garden insects, various crop and stored product insects. A resumé of control methods, with a bibliography, a brief glossary and an index close the work.

This book should be of interest to economic entomologists in our own South and Southwest because of the identity of so many crops in both regions. It is also valuable for the many life-histories it contains of hitherto unstudied forms.

It should always be remembered that Perú is not a homogeneously tropical land. The country has at least four distinct climatological zones: the rainless coast, arid except where rivers furnish irrigation water; the cold mountains; the high subtropical, almost temperate plateaux; and the Amazonian tropical forest rain belt. This division brings with it faunistic changes responsive to the regional differences. Up to the time of this book, very little has been known about the coastal insects of Perú—at one recent time only *five* Heteroptera had been recorded from its Pacific coast. The greater part of insect records from Perú have come from the trans-Andean region, largely from the Amazonian basin. In this view "Entomología Agrícola" becomes a faunistic study.

The work is a well-written, well-arranged text, of interest to us in this country because of new or little-known facts presented.

The author, Dr. Wille, and the Peruvian government merit great praise for giving us this important work.

Chilopods in the Collections of the Field Museum of Natural History, by Ralph V. Chamberlin. Zoological Series. Field Museum of Natural History, vol. 28, no. 4, pp. 175–216, plates 13–17. Chicago, Ill. 1944.

This is an annotated list of the group, with synonymies and numerous new species.

A Revision of Nearctic Dorylidae (Pipunculidae), by D. Elmo Hardy; University of Kansas Science Bulletin, vol. XXXIX, part I, pp. 1–231.

This is a monograph of the known Nearctic species of this dipterous Family, with keys to Subfamilies, genera and species.

J. R. T.-B.

Delayed Hatching of Praying Mantis (Tenodera sinensis).—Out of a large number of oöthecae of the praying mantis, *Tenodera sinensis,* collected during the winter of 1943, a dozen failed to produce any young mantids during the following spring and summer. In an effort to discover if hatching is ever delayed until the second season, I placed these twelve egg-cases in a mason jar and screwed the cap on tightly. The jar was placed in a corner of my study where it remained until the fall of 1944. During the second summer, three of the oöthecae produced young insects. The hatchings were comparatively small and the total for the three egg-cases was 112 young mantids.

E. W. Teale, Baldwin, L. I., N. Y.

EDITORIAL.

"ROUGE ET NOIR" OR ROULETTE.

What has gambling to do with descriptive entomology?

This—that both operate under the mathematical theory of chance.

Of course, immediately the free and independent entomologist surges in rebellion and enters a violent denial. But the stubborn fact remains.

Fundamentally in all descriptions of groups in which a given series of characters is used, which characters by combination tend to segregate any given form from others in the same group, the descriptive entomologist implicitly accepts as a fact that there is a vanishing chance that any other form will identically duplicate any given series of such characters.

For example, let us take any three structural characters (taken at random) which vary three ways; such as 2nd antennal segment longest, shortest, or equal to any other segment; head as broad as long, longer than wide, or shorter than wide; ventral rings all equal in length, last ring shortest, last ring longest. In such an example we find by elementary algebra, that 27 distinguishable forms can be separated by these three characters and variations. If these were 10, each distinctly varying in some three ways, it would mathematically be 3^{10} (i.e., 3 to the 10th power, or multiplied 10 times by itself), which would yield 59,049 distinct combinations!

This does not take into account the absence of any one character, or of all the characters except one. In the first example, with one character absent, it would still be possible to separate 9 forms; with 2 absent, 3 forms; which could be added to the original 27, making in all 36! This applied to 10 characters varying 3 ways would give an almost astronomical figure of possible differentiations.

Don't believe me—ask any adequate campus mathematician to verify it for you, and you'll be surprised.

When it comes to red-and-black, read and ponder Dr. H. H. Knight's two papers on the coloration of *Perillus bioculatus*. And there still are entomologists who employ color as the sole criterion of species or lower categories! Color as a fluctuating supporting character, yes; as the sole criterion, no.

And finally, an entomologist operating with ten three-way characters is betting at odds of 59,048 to one, that Nature is not going to produce an exact duplicate of what he described!

J. R. T.-B.

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